Decs Index to follow.

Municipal Engineering

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Town Scavenging and Refuse Disposal

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UTILIZATION OF RESIDUALS FROM REFUSE DESTRUCTORS.

THE utilization of the residuals from refuse destructors is a matter which has lately been attracting considerable attention. It will generally be granted that refuse destructors are capable of destroying refuse so as to render the resultant residuals perfectly harmless to health, and that a certain amount of steam can be produced in the process. The residuals, however, which amount to about 33 per cent. of the total refuse dealt with in the destructor, have got to be disposed of, and if they cannot be utilized their disposal may add considerably to the cost of working the destructors. The residuals consist mainly of clinker and fine ashes, the exact composition depending entirely upon the nature of the refuse. In some instances this can be sold direct to builders for use as concrete or mortar, or as a foundation for roads, etc. In others there is only a demand for it after it has been broken and screened to different grades. In London considerable difficulty is experienced in disposing of it at all, owing to the stringent by-laws of the County Council. Various methods have been tried to utilize the clinker by the manufacture of paving stones, bricks and mortar. Their production has, in many cases, been successfully accomplished, but even then the difficulty of finding a market for them has to be faced, as, although they can generally be produced at a cost below that of natural stone, they are not so durable.

Mr. A. May, cleansing superintendent of the Metropolitan Borough of Finsbury, has found that they are quite unsuitable for the heavy traffic in his district, and thousands of square yards had to be taken up after they had only been laid two years. On the other hand, Mr. H. Percy Boulnois, in a paper read before the Royal Sanitary Institute, referring to the bricks manufactured from the destructor clinker of the Metropolitan Borough of Fulham, stated that they did not command a very ready sale, "as they are very hard to break, and the bricklayers find them rather harsh to handle and impossible to break with the usual blow from the trowel." The processes of slab making that have been adopted in various towns differ somewhat, both as to the mode of manufacture and the composition of the stones produced. This may possibly account for the varying results which have been experienced in different towns, but of course the nature of the traffic to which they will be subjected must be taken into consideration. In order to show what has been done up to the present in the way of utilizing destructor residuals the author proposes to describe several processes which are in operation in England.

Clinker Grinding at the Kidacre Street Works of the Corporation of Leeds.—The clinker removed from the destructors in Leeds is ground to about one-quarter inch in size, and is used by the Tramways Department for sanding the rails in greasy weather. Mr. Mann, the cleansing superintendent, states that it is more effective than sand. The price paid by the Tramway Department to the Public Health Department is two shillings per cubic yard. The quantity used is so great that the supply barely equals the demand, notwithstanding that all the clinker produced during dry weather is stored until required.

The clinker is first passed through a stone-breaker, after which it is ground in a crushing pan 7 feet in diameter. After passing from the crushing pan it is raised by a continuous chain elevator, sifted on special screens and conveyed into hoppers, from which it is delivered to the carts, which are drawn up underneath.

Clinker Grinding at the Metropolitan Borough of Fulham's Destructor Works.—A certain amount of the clinker produced at these works is used for the manufacture of slabs and bricks, but there is a good deal of surplus material, which is disposed of to builders for the manufacture of concrete and mortar. The clinker is first passed into a granulator, on passing from which it is conveyed in an endless chain conveyor to a magnetic separator. This machine is designed to extract any nails or small pieces of iron or steel there may be in the clinker, as by so doing it is made more suitable for building purposes, and consequently has a higher marketable value. The magnetic separator consists of an inclined revolving cylinder, having magnets placed along its length at intervals. The magnets are excited by a dynamo. A trough is placed inside the cylinder, running the full length, but it is not connected with it in any way. The clinker is fed into the cylinder at one end, and, as the clinker revolves, slowly makes its way out at the other. Any nails or pieces of iron, etc., are picked up by the magnets, which break contact every time they come round to the top, thereby dropping any metals they may have picked up into the trough, from which they are emptied into barrows and removed. The clinker on passing from the separator is conveyed to a mechanical sifter. This consists of a long trough, having a perforated bottom composed of zinc sheets. The perforations are of three sizes, the smallest being those nearest the feeding end of the machine. The trough is worked rapidly backwards and forwards by means of a cam revolving at high speed. Under the trough are placed three hoppers, into which the different sizes of material fall, all that is too large to pass through any of the perforations making its way to the end of the trough. The hoppers are provided with doors in the bottom and are placed at such a height that carts can be drawn up underneath and filled direct. The clinker is sold at one shilling and sixpence per cubic yard at the works.

Screening by Hand at the Destructor Works of the Metropolitan Borough of Hampstead.—The clinker is laid out on the ground and crushed by men using punners. The crushed clinker is then passed through a revolving screen, which is worked by hand. The screen has three sizes of mesh, and the clinker which passes through the two larger sizes is sold at one shilling per cart load, while that which passes through the finest realizes about eight pence per load.

Flag Making at the Destructor Works of the Ealing Corporation.—The clinker is placed on the ground in a layer about fifteen inches deep and a steam roller is run over it in order to crush it. It is then screened in coarse screens, and any tins or pieces of under-burnt material are removed. The clinker retained on the sieves is used for filling the contact beds or filters at the corporation's sewage purification works, which adjoin the refuse destructors. The material that passes through the sieves is screened a second time to remove the dust, after which it is utilized for the manufacture of paving slabs in the following manner: Three parts of clinker, one part of cement and a sufficient quantity of fine dust from the combustion chamber of the destructors to fill the interstices (about 1 in 8) are mixed with a small proportion of water in a revolving mixer. When the mixture has become thoroughly incorporated a sufficient quantity to form one slab is placed in the die of the pressing machine. The die is of soft steel, but a piece of zinc is placed on the bottom before the concrete is put into it, partly to give the slabs a smooth face and partly to prevent them adhering to the die. A sheet of perforated zinc is also placed on the top, and a piece of coarse canvas laid on this. The die is then put into the press and a pressure of 2,000 pounds per square inch is brought to bear on it. The die remains in the press for about one and a half minutes, when it is taken out and the concrete slab is removed and placed on one side under cover for about a week so as to get thoroughly hard. They are then stacked in the open for about six months so that they may mature. The slabs are made in sizes of 2 by 2 feet, 2 by 2.5 feet and 2 by 3 feet, and they are about 3 inches in thickness. They can be made at the rate of about 20 per hour when the clinker has been already prepared. The cost of producing the slabs is from one shilling and nine pence to two shillings per yard super, inclusive of labor, materials and depreciation of plant.

Flag and Brick Making at the Destructor Works of the Metropolitan Borough of Fulham.—The processes of slab and brick making are carried out as follows: The clinker is shoveled into a feeding trough, which conveys it to a granulator. After passing from the granulator it is raised in a conveyor, consisting of an endless chain having a number of small buckets at-

tached, to a mixing mill, where the cement is added and the whole thoroughly incorporated. The proportions used are, for the manufacture of bricks, 9 to 1, and for the manufacture of slabs, 3 to 1. The correct proportions are obtained by having the cement placed in a gauging box alongside the mill, a small amount being added after every certain number of buckets have been emptied into the mill; the exact number required to give a cubic yard being known. Water is added to the clinker and cement in the mill. For brick-making a very stiff mixture is used, but for slab-making the mixture must flow easily. The granulator and mixing mill are belt-driven machines, the power required being obtained from an engine supplied with steam from the three-mold machine made by Messrs. Fielding & Platt, Ltd., of Gloucester. The molds are placed on rests attached to a central pivot, which is revolved by means of a ram. The mixture is first run into the mold on rest A. This is then moved into position B and the hydraulic pressure applied. The mold is then shifted to position C, where a vacuum plate is attached to the top of the slab, which lifts it out of the mold. The action of the vacuum plates is shown in Figures Nos. 1, 2 and 3. The plate is suspended from an overhead crane by means of the chains D D. When it is wished to remove a slab the ram is forced upwards against the discharge plate A until the slab B comes in contact with the plate C. This plate has a tube, E, which is connected to a

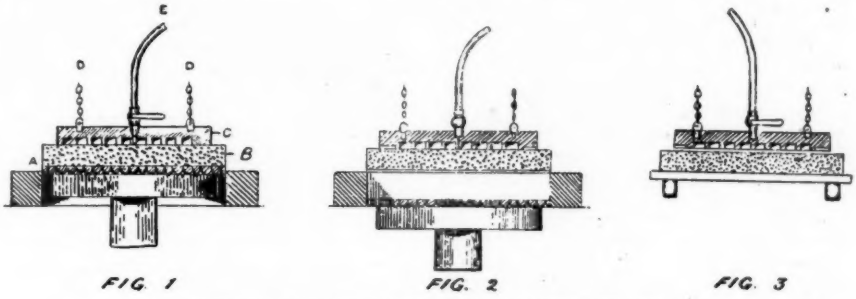


FIG. 1 FIG. 2 FIG. 3

VACUUM LIFT FOR ARTIFICIAL PAVING SLABS.

destructor boilers. The mixture is drawn from the mill down one or the other of two chutes, which convey it either to the brick or slab-pressing machine. These machines are worked by hydraulic pressure, supplied from an accumulator, the total pressure required for brick-making being 60 tons and for slab-making 400 tons, the whole of which is concentrated on the slab.

The brick-making machine is by Messrs. K. Whittaker & Co., Ltd., of Accrington. The bricks are made in molds; these are run under the chute leading from the mixing mill, filled with the mixture, scraped flush and then run into the machine entirely by hydraulic pressure. The molds are moved backwards and forwards automatically by means of a revolving cam. The bricks weigh about 5 lbs. 14 oz. each, and they absorb only about 6 per cent. of their weight of water. They are very hard, and have a greyish blue color, somewhat resembling Staffordshire blue bricks. They can be produced at the rate of nine per minute, and the cost of manufacture is about £1 per 1,000. The slabs are made in a vessel in which a partial vacuum is always maintained. The result is that as soon as a cock is opened a partial vacuum is created over the whole of the surface of the plate in contact with the slab, which is sufficient to hold it. Figure 2 shows the ram back in its first position and the slab being held by the vacuum plate. As soon as the slab has been placed on the trolley on which it is to be removed the cock connecting the vacuum vessel with the plate is closed and air is readmitted to the channel spaces, thereby releasing the slab. This system of lifting avoids all handling of the slabs, so that there is no risk of damaging them while still green. The molds in which the slabs are made consist of wooden frames, with a perforated steel top, the perforations being 3/32 of an inch in size on the inside and ⅝ of an inch on the outside. A piece of brown paper is laid on the bottom of the molds to prevent the slab adhering to the zinc; this is removed previous to the slab being deposited on the trolley. The slabs are kept in the open from three to six months, so that they may ma-

ture before being used. The following sizes of slabs are made: 3 ft. by 2 ft., 2 ft. 6 in, by 2 ft., and 2 ft. by 2 ft.; they are 2¼ inches in thickness. They can be made at the rate of 8,000 per day, and the labor required is as follows:

One man to shovel the clinker into the granulator; a boy to attend to the mixing mill; one man to superintend the filling of the molds and to apply the hydraulic pressure; two boys to remove the finished slabs, and a general foreman to superintend the whole of the operations.

The slabs cost about 2 shillings 8 pence (65 cents) per square yard to produce and sell readily at 3 shillings (75 cents) per square yard.

Sewage and Refuse Disposal in Memphis, Tenn.

THE city of Memphis, Tenn., is located on a bluff nearly 50 feet above high water in the Mississippi river and nearly 90 feet above low water. Back of the bluff is the Bayou Gayoso, which flows through the city for some 15 miles and provides a natural outlet for street drainage but not for sewage. Branches of this bayou drain most of the city. The sonth city line is near the summit of the bayou's watershed, and that stream flows north nearly the whole length of the city and discharges into Wolf river, which, in turn, discharges into the Mississippi river, which flows in a southerly direction in front of the city. Some of the city in the vicinity of the outlet of the bayou is below the level of high water in the river. Less than 200 acres of this low land, aside from that included in the bayou itself, is behind the levee which has been constructed to keep out the river water.

The sewers of the city were constructed according to the separate system. The "Early History of Sewers of Memphis" is told in an article by a former city engineer in MUNICIPAL ENGINEERING, vol. xxxvii, p. 232.

The surface water gathers on the streets and is carried to the nearest branch of the Bayou Gayoso, or to the bayou itself. The outer districts to the south and east drain into other streams. Some of the methods of treating the storm drainage problem at street intersections are shown in an article by J. H. Weatherford, the present city engineer, in vol. xxxvii, p. 374. These methods are not everywhere satisfactory and some storm water sewers will doubtless be constructed before long, particularly for the service of the heavily traveled streets on which foot traffic is at time seriously impeded by the rush of water or the gathering of water faster than it can get away.

During ordinary stages of water the sewage from the sanitary system runs into the river through the 48-inch outlet directly into Wolf creek near its mouth. When the water in the river rises 28 feet above datum, which is near low water, this outlet is closed by a gate and then the sewage has heretofore run through a 36-inch pipe to a pumping station located close to the Bayou Gayoso. It may here be turned into the bayou behind the levee, may be pumped into Wolf creek or may be turned into a relief reservoir on one side of which the pumping station is located. This reservoir is 105 by 150 feet, approximately, in horizontal dimensions and has a wall 5 feet high. The banks extend 10 feet higher, so that, if necessary, something like 15 feet depth of water could be carried in the reservoir.

Should it rain on the bayou watershed while the river is over 28 feet above low water, the pumps in the pumping station are started so that the low ground behind the levee will not be flooded.

The pumping station and reservoir are also designed to take care of the flow from two storm water sewers, delivering directly to the pump pit, one of which from the south and west sides of the bayou is 36 inches and one from the north and east sides 30 inches in diameter.

The station is equipped with two large horizontal centrifugal pumps. One 20-inch pump is operated by a 150-h. p., a. c. motor, 60 cycle, 2,200 volt. The other 24-inch pump has a 175-h. p. motor. There is also an 8-inch vertical centrifugal pump, with a 40-h. p. motor. The bayou gates are closed when the water in the river reaches 28 feet, and the pumps are started as soon as it rains hard and the storm water begins to raise the water behind the levee. When high water reaches 34 feet the pumps are kept going so as to give some leeway in case of a heavy local rain. The pumps are ordinarily put in use about twice a year. Occasionally high water lasts several

months and during such times the pumps must be started whenever it rains.

A new pumping station was recently completed which is located on the 48-inch outlet sewer, or rather on a lot abutting on the street in which this sewer is laid. This station will take care of the discharge from the sanitary sewer system, so that, except in case of accident, it will not be necessary to turn the sewage over to the bayou or the reservoir at the old pumping station to be taken care of with the flood water.

A gate in the 48-inch sewer is closed when the water in the river reaches about 28 feet and the pump is started, taking the sewage out of a pump-pit connected with the sewer above the gate, and discharging it into the sewer on the river side of the gate. By using a by-pass on the old branch to the old pumping station the pumping at the new station can be reduced, if necessary or desirable, to the days of heavy rainfall and the river above 28 feet.

The pump pit at the new station was sunk by the use of a boiler-plate cutting edge on a caisson of 18 feet inside diameter. This was settled by excavating round the caisson and building a concrete wall on top, which gradually settled the well casing to place. The bottom of the pump pit is 22 feet below the floor level. The machinery at present installed is a 20-inch centrifugal pump, with 24-inch discharge, operated by a 150-h. p. 200-volt, 3-phase, 60-cycle motor, supplied by the Dayton Hydraulic Co., Dayton, O. The regular design of the pump made by this company was somewhat modified to suit the work to be done. The small building housing the machinery is of concrete—walls, floor and roof—and is large enough for duplication of the machinery.

In its treatment of garbage and refuse the city of Memphis differs but little from other cities. There are in regular service 60 garbage carts, each drawn by a mule and operated by a colored man. There are 75 carts that can be put into service when necessary. There are also a paper wagon and a paper cart in regular service which pick up dry refuse which is not too heavy. Ashes are also collected and used for filling. Ordinarily from 90 to 110 cart loads of garbage are collected each day and about the same amount of ashes are collected during a part of the day by the same carts.

The garbage collection and disposal are under the board of health, and in close connection is the street sprinkling department, which operates from 45 to 50 sprinkling carts, each drawn by 2 mules and operated by a colored man.

The garbage destructor is an old Dixon furnace which has been reconstructed and modified until it is quite different from the original plant. It is located in a thickly populated district and, to judge from the day of the writer's visit, is operated practically without nuisance. The combustion of the garbage requires the help of two or three tons of coal a day, which is increased to four tons during the watermelon season, on account of the great amount of moisture in the garbage from watermelon and other fruit refuse.

The cost of operating the system of garbage collection and disposal, including pay-roll and feed for mules for both garbage carts and sprinkling carts, is about $3,000 a month. About 100 mules are required for the sprinkling carts and 75 for garbage carts. The garbage crematory requires one fireman and four burners, three day and two night watchmen, besides the cart men. There are two plants, and besides the stable boss at each stable there are at each two stable men.

The cart men receive $1.50 a day, firemen $2.

The class of labor employed is not of high efficiency and it is not possible with the small supervising force which the funds of the board can employ to educate them to neatness or thorough cleanliness. There is little connected effort to educate householders to their duties.

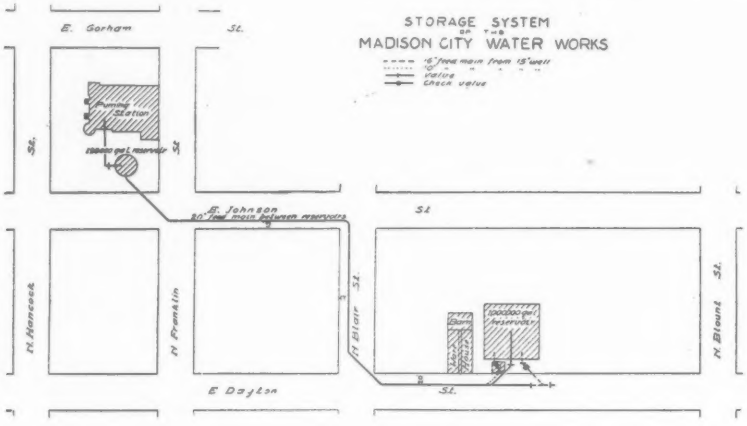
The results obtained as to lack of nuisance in collecting and destroying refuse and as to condition of back yards and alleys are quite commendable under the present handicaps.

The stables are located about the garbage furnace and are kept in very fair condition. They are quite as objectionable in a neighborhood as the garbage furnace and might easily become much more so. In fact, there is little or nothing about the crematory to object to, what complaint there may be under ordinary conditions being based on the numerous loads of garbage hauled through the streets rather than on any emanations from the plant.

The Water Works of Madison, Wis.

By Ralph Birchard, Madison, Wis.

FEW cities in the world have a better quality of water supply than that which is taken from the deep wells at Madison, Wisconsin. These wells tap the artesian reservoir in the Potsdam sandstone at a depth of about 750 feet. The water rises in them to within about 60 feet of the surface. It contains no organic matter and only enough calcium and magnesium carbonates to make it thoroughly palatable. Its analysis corresponds rather closely to that of the water from the famous Bethesda spring at Waukesha.



The water is furnished to the city through 58 miles of mains varying in size from 3 to 16 inches. The average daily pumpage at present is 1,700,000 gallons, or 56 gallons per capita of Madison's 30,000 population. Pressure in the mains varies from 40 to 85 pounds per square inch. The pressure at the central pumping station is 125 pounds. A small standpipe near the center of the city acts as a pressure equalizer on the mains radiating from it.

All the water is pumped through an Allis-Chalmers triple-expansion vertical pump, which has a capacity of 3,000,000 gallons. At the time of the original installation in 1883 the few wells in the central station supplied enough water for the city. As the demand has increased it has been found necessary to sink new wells. There are now 10 in all. These wells must be spaced at least half a block apart to give full flow. Because they have been placed at some distance from the central pumping station, the system of having an auxiliary pump at each well has been adopted.

Three wells are now equipped with smaller deep-well pumps, operated by electric motors. Two of these are P. K. Wood propeller pumps, 7 and 8 inches, respectively, in diameter, while the third is a Byron Jackson 9-inch centrifugal. These pumps lift the water about 75 feet and supply the feed reservoirs, which are drawn upon by the large pump. Two reservoirs are in use. One, on the central station grounds, has a capacity of 198,000 gallons, and the other, about 3 blocks away, will hold 1,000,000 gallons. They are connected by a 20-inch main, so that the water stands at the same level in both, the float gauge on the small reservoir indicating the amount of water on hand at any time. The deep well pumps supply about 800,000 gallons per day, or nearly one-half of the total quantity. The remaining part of the daily pumpage is drawn direct from wells by the large pump at the central station.

Current to operate the deep-well pumps is generated at the central station. A simple engine, which formerly formed part of a Reynolds-Knowles-Corliss pump, is connected to a Northern Electric Company 100 k. w., d. c. generator. Current is supplied to the motors at 550 volts pressure.

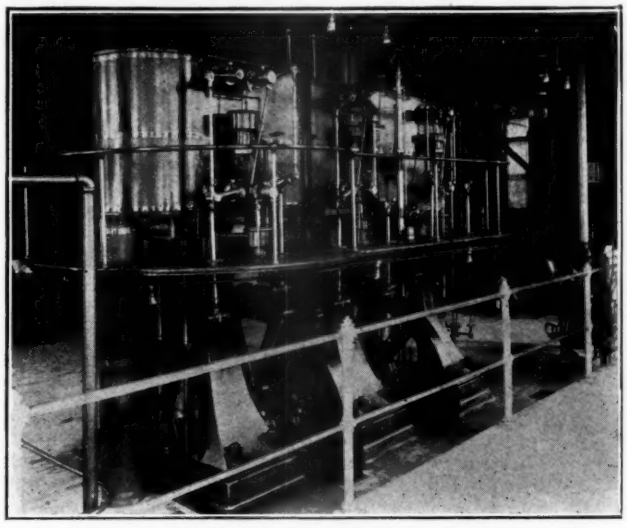
Under ordinary conditions of service

only two deep-well pumps are in operation at the same time. These will lift 80,000 gallons per hour into the reservoirs, placing a load of 100 h. p. on the engine. The coal consumption of this engine is very high, 3½ pounds per h. p. hour. The coal used is anthracite pea, now being furnished at $7.10 per ton. Fuel is the largest item in the cost of the deep-well pumping. The cost of firing the boilers remains the same whether the engine is running or not. One man is required at each pump and paid at the rate of 20 cents an hour. The cost of the deep-well pumping at the rate of 80,000 gallons per hour is, then:

350 lbs. of coal at $7.10 per ton	$1 24
Attendance	40
Oil, waste and repairs	20
Total	$1 84

Or 2.3 cents per thousand gallons.

The total cost of pumping for the year 1908-09, including maintenance and repairs, was $0.0425. From this it appears that half the cost of the water pumped in two stages came in the operation of the deep-well pumps. The cost of pumping has been slightly higher in the last few years since the deep-well pumps were installed. The table below shows the cost of pumping in cents per thousand gallons. The cost of fuel has been taken at $7.10 per ton in all years in order to secure a true comparison between past and present conditions. Although the cost of pumping does seem to have increased slightly, it is probably far less than what it would be if the attempt were made to pump directly from all the wells. In fact, with the present machinery, this method would be out of the question, as the supply secured that way would not equal the present demand.



MADISON, WIS., WATER PUMPING STATION.

Main Pumping Engine In Foreground. Dynamo Furnishing Power for Electric Deep-Well Pumps In Right Background. Indicator of Water In Reservoirs on Wall at Right of Main Engine.

Year	Pumpage in Millions of Gallons	Fuel Used Tons	Duty in Gals. per lb. of Coal	Total Expense	Cost per 1000 Gals. Cents
1890-91	198	522	190	$ 9,733	.0491
1895-96	325	779	209	16,046	.0493
1900-01	358	788	227.	13,756	.0383
1902-03	420	774	272	18,177	.0432
1904-05	537	912	294	18,436	.0343
1906-07	531	1,103	240	21,220	.0399
1907-08	570	1,315	217	28,056	.0492
1908-09	617	1,685	184	26,177	.0425

It is evident that the coal used in generating electricity produces a much smaller result in lifting water than when used directly in the large pump, but probably not as small a result as if the steam pump were lifting water from wells some distance from the central station.

A large item in water consumption in Madison is the amount used for

street sprinkling, sewage dilution and fire protection. For these purposes the water could well be taken from Lake Mendota. The proposition of laying a parallel system of mains through the downtown district, filled with a separate circulation of lake water is now under consideration by the Board of Water Commissioners.

The meter system of water rates is used by 99 per cent. of Madison's 4,601 paying water-takers. The rates in force are:

Three thousand cubic feet or less, per year, $4.00; next 5,000 cubic feet, 13c per hundred cubic feet; next 15,000 cubic feet, 10c per hundred cubic feet; all over this amount, 5c per hundred cubic feet; minimum charge, per year, $4.00.

The average income per meter installed in Madison was $8.93 last year. A few takers still use the schedule basis, where a minimum charge of $5.00 per year is made.

The work of laying water mains has been carried on with marked economy in Madison through the use of the trench-excavating and pipe-laying machine designed by Mr. John B. Heim, superintendent of the water works. This machine was described by Mr. Heim in MUNICIPAL ENGINEERING for June, 1909.

The Young Engineer and His Working Tools

By Charles Lyon Wood, C. E., Columbus, Miss.

THE various technical schools throughout the country are turn-out their quota of graduate engineers. Fortunate indeed is the student who has been able to spend his vacations in actual work as axeman, chainman or rodman with some engineering party and thus learned the rudiments of the profession at first hand, and fortunate is he also who, having had nothing during his college course but picnic surveys and campus practice, has the common sense to leave his diploma in his trunk and solicit a job as axeman, chainman or rodman. It is better to go up than down, and in order to stay up one must know every step of the trail.

Not all graduates will get positions, and of the positions secured many will be temporary, and so the young engineer will need to get together an outfit as early as possible and engage in private practice "between jobs" at least, taking whatever work comes his way, running land lines, terraces and drainage ditches for farmers, sidewalk levels, etc. To this class of beginners the following suggestions as to field and office equipment and use of the same are offered by one who has "done the don'ts" therein mentioned. The lists of instruments and books named are believed to contain no "junk":

One transit, standard make, 4½-inch needle, variation plate, fixed stadia clamp and level on telescope, split-leg tripod, leather-covered box with carry straps.

One 18-inch Y-level, cloth finish, split-leg tripod.

Two ranging poles, preferably wood.

One ranging pole, take down, for easy carrying on trains, etc.

One 100-foot steel tape.

One 50-inch pocket tape, steel or copper-woven.

One level rod.

One brazed link gunter's chain, 66 foot. (Pocket compass and hand level.) Get transit tripods interchangeable. This will reduce the travel load when there is only one operator for both instruments.

As to transit and level, each engineer has his opinion, usually based upon the make with which he is most familiar. Personally I prefer a Young or Bausch & Lomb transit and a Young or Gurley level. The young engineer should be careful in his first purchases, for an unsatisfactory instrument is practically unsalable, except at a tithe of its cost, and a few dollars may represent the difference between an instrument good for a lifetime and one that you expect to use for "just a while."

The young practitioner is usually short of funds, hence the temptation to buy cheap goods or second-hand goods. Beware of second-hand instruments. No matter how carefully a damaged machine may be repaired, it is not quite the same as before. This is not to say, on the other hand, that every new instrument is up to requirements. Many are failures from the factory and each should be subject to a thorough trying out in the field by an experienced engineer.

An instrument once bought should be well taken care of. When not in use it should be kept in case out of the

dust. The transit needle should be clamped up when carrying the instrument from place to place and immediately released when at rest. A 4½-inch needle is much more sensitive than a 6-inch.

Do not allow idlers to "monkey" with your machine. The best way to carry an instrument when traveling by conveyance or train is on your lap, and in this case a canvas or rubber drawstring bag should cover the instrument. In case of wreck, save the machine. The writer remembers a railway wreck when he was thrown out of the caboose, but instinctively and in spite of skinned arms, kept the transit out of harm.

The young engineer should be able to make the necessary instrument adjustments quickly and accurately, but he should realize that he can reduce largely the amount of "tinkering" required by careful handling of his instrument, and he should be certain also that the instrument is really out of adjustment before he attempts to tinker at all. He should likewise know when to let "good enough alone," for an instrument in approximate adjustment and handled as though it were out, applying the checks of reversal and double shots, will insure better results than if the operator adjusts to a "hair nicety" and then goes on faith in his achievement.

A common source of error in transit work is the neglect of the operator to get a proper focus on his ranging rod, and for this reason the instrumental focus should not be "strained" by excessively long shots, two sights of 1,000 feet are usually better than one of 2,000 feet. In ordinary level work the chief sources of error are two: Refraction of air and error in reading the rod. It is assumed that the leveler reads his own rod, and does not follow the antiquated method of the books. The sole duties of the rodman are to set the rod, call the station number and cut bench marks.

A good general purpose steel tape is required. Keep the kinks out of this tape and it is practically unbreakable. Drays and wagons have no effect upon it. A vest-pocket repair kit for 25c of one maker does its work as well as any $5.00 outfit of my knowledge.

For land surveying a 66-foot tape or brazed link chain is much preferable to the 100-foot railroad tape (the Gunter's chain is the unit of land measure), as its use will save a vast amount of figuring in computing areas. I prefer to have two chains attached by a snap for long measures. Green hands can use the 66-foot chain on land surveys much more readily and keep count more accurately than they can the 100-foot tape, and the young engineer can count on his share of "greenies." Often he will have to make surveys when he himself is practically the corps and his day's work will depend on his individual energy and ingenuity. Once I made a land survey with a party composed of Choctaw Indians who could not speak a word of English. On another occasion I set out a curve for a street car line with only one helper.

Other instruments used on surveys are the plane table, solar compass and theodolite, but these are usually furnished by the employer.

After the survey comes the office work, and this leads us to the tools on the drafting table and the table itself.

Drafting tables are of two kinds—stationary or portable. They are also, as to top, flat or tilting, the one thing of importance being that the top shall have a true working surface, free from knots and hard grain, and that it sets squarely upon the logs or benches. Nothing is more conducive to profanity and poor work on the part of the draftsman than a weak, springy top set on rickety benches. White pine makes the best table top, next in order red gum and cypress, and two inches is about the right thickness for office use. Any good carpenter can make a good drafting table if you will tell him how and watch him all the time. If the material used is red gum or cypress, it should be cut into strips 1x2 inches and length of table wanted, thoroughly kiln dried, set edgewise and built up on counter-sunk battens, working from the middle each way, and the surface dressed to line. A top so built will not shrink or warp, and can be mounted on any style of support desired. I prefer ordinary trestle benches.

The table should be provided with a drawer underneath as long as the table is wide and pulling from each side. It will be found very convenient to have a long table, say 4½ by 8 feet, and a separate top about 3 feet by 4 feet, which may be rested on the larger and used for small drawings.

The following list will include the drafting instruments needed by the young engineer in general practice, and here the same precept holds good as with the field instruments. "Buy only what you actually need, and get that good." No brass.

One straight line pen, large.
One straight line pen, small.
One R. R. pen, double line.

One compasses, pen and pencil points and lengthening bar.
One bow pen, with pen and pencil points.
One bow spacer.
One spring dividers.
One steel triangle, 10-inch, 45x45x90 degrees.
Two zylonite triangles, 30x60x90 degrees, and 45x45x90 degrees.
One straight edge, steel or wood, 42 inches.
One straight edge, steel or wood, 24 inches.
One triangular scale, 12-inch, boxwood, with white edges.
One beam compass.
One half-circle brass protractor.
One 3-minute vernier protractor.
Two irregular curves.
One adjustable curve.
Nest of railroad curves, difference 30 minutes from 1 degree to 10 degrees; three-inch tangent, steel eraser, thumb tacks, rubber erasers.
One dozen Kohinoor pencils—2H, 3H, 4H, 6H.
Assorted inks.
Brushes.

Finally we come to the very thing the embryonic engineer started with, books. What does he need? What sort of an office library shall he build up? What of his college texts is worth a place in it? Here the same rule applies as to instruments except more so, for engineering books become obsolete much more quickly than do engineering instruments. The rapid advances in all branches of engineering make the authority of today a back number tomorrow. (This does not apply to logarithms and trigonometric formulæ. One is safe in buying these.) I have among my "curios" a text on Railway Engineering written a good many years ago by one of our foremost professors and sold largely in advance at $25.00 per volume. I bought my copy from a fellow practitioner for $3.50, but I did not gain that worth of information from it, and I doubt if there is a single thing in the book that applies to railroad engineering and management of today. The young engineer should go slow on encyclopedias of the "exhaustive" type—exhaustive of purse rather than subject, they will prove to him. He should read the engineering surrent literature such as *Engineering News*, MUNICIPAL ENGINEERING, *Engineering-Contracting*, and cull from these materials for a line of scrapbooks. A well-indexed scrap-book is very valuable, for it carries a touch of individuality. The compiler is an author in spirit. He can in addition profitably invest in the following list of books:

Butts' Field Engineering (pocket book).
Trautwine's Pocket Book.
Webb's Railroad Construction, Theory and Practice.
Turneaure-Russell: Public Water Supplies.
McCullough's Engineering Work in Towns and Small Cities.
Johnson's Surveying.
Molitor & Beard's Manual for Resident Engineers.
Gillette's Handbook of Cost Data.
Reinhardt's Lettering.
Elliot's Engineering for Land Drainage.

Making a Stream Excavate Its Own Reservoir and Build Its Own Dam

By Burt A. Heinly, Los Angeles, Cal.

MOTHER NATURE is a kind old soul if she is handled in the right manner, and it is the faculty of the successful engineer to treat her kindly and favor her moods, but always to his own advantage. Here is an instance of how a stream was made to excavate dirt and stones, carry the debris more than half a mile to a dam site, deposit it in an impenetrable mass across a little canyon and in the end to impound the stream flow to form a lake three-quarters of a mile long, half a mile wide and more than fifty feet deep.

The methods used were those of the hydraulic filled dam—a plan of construction which, through its cheapness, practicability and the satisfactory results attained, has gained great popularity in the West since the first experiments, which were made only a few years ago. In fact, it is only an adaptation of sluicing as it is used in placer mining.

The city of Los Angeles required larger and more storage reservoirs to guard itself against the danger of a water famine during the hot, dry summers. William Mulholland, the city's

water superintendent, sought a reservoir location and after finding a site a mile from the Los Angeles river, which is the city's source of supply, he set about the construction of a dam. Before the structure was completed he had made recourse to a number of novel engineering features.

In the first place it was necessary to bring the water to the depression in the hills in order that the precious fluid might be placed at work to the best advantage. This was accomplished by the construction of a concrete conduit and half a mile of tunnel. In the meantime, while this was being done, a force of men were at work at the lower end of the valley. To shut off any percolation underneath the dam a trench 20 feet wide was excavated 30 feet to bed rock and a steel curtain, imbedded in concrete, was carried to a height of three or four feet above the original surface in the center of the valley.

In this way a small construction reservoir was built and as soon as the water was turned into the valley Mr. Mulholland was ready to place it at work. How large a task was set before Mother Nature may be seen from the fact that the Silver Lake dam as it stands today contains 146,000 cubic yards of earth, is 900 feet along the crest, 56 feet high and impounds 273,000,000 gallons of water for the city's needs.

A force pump was rigged up and to this were attached lines of fire hose and nozzles. Under a pressure from 60 to 100 pounds per square inch these hydraulic jets, as shown in the illustration, excavated the earth, which, dissolved by the water into a semi-liquefied mass, flowed slowly down the slope to a sump. Here a small centrifugal pump had been prepared to take care of it. As the earth and water were sucked into the pump they were as quickly projected out of it through a line of eight-inch steel casing to the dam site half a mile away.

On each side of the dam site embankments from three to four feet in height had been raised to retain the liquefied mass and as the dam continued to increase in altitude these slight embankments of soil were kept always several feet above its surface.

The earth and water flowed slowly along between the two banks and solidified into a solid mass for two reasons: First, because of evaporation under the hot California sun, and, secondly, because Mr. Mulholland played a neat little trick. Naturally, at the end where the liquified mass first entered the dam

SILVER LAKE RESERVOIR, LOS ANGELES WATER SUPPLY.
Hydraulic Fill Dam on Left.

the elevation was always highest. So at the other end, whatever water reached there was drawn off into the constantly enlarging reservoir and so made to work over and over again.

The water carrying its burden of dissolved earth, was guided along the inside of the earth walls before described by flumes and lateral branch pipes. As the mass moved the more slowly the heavier particles and the sand were deposited first, but the finer particles of clay, being nearer in solution, were the last to be precipitated and so were carried to the very middle of the dam, where, as the work progressed, Nature built a strong semi-metallic wall at the point where the greatest strength in a dam is needful, namely, along the middle of the structure. And while the dam extended itself outward and upward the hydraulic jets continued to increase the area of excavation and so increased the capacity of the reservoir.

The dam was approximately nine months in building, cost $55,000, where by adopting the old-time methods it would have cost twice that amount, and served a most useful purpose in view of the fact that the many lessons learned are soon to be applied to the construction of the earthen dam of the great Haiwee reservoir, one of the impounding basins of the Los Angeles aqueduct system, hitherto described in these pages.

That the hydraulic method is a safe one is shown by the fact that no leakage or fault has developed since the construction of the Silver Lake dam two years ago, and that it is practical and simple is demonstrated by the equipment gotten together. This consisted of the odds and ends usually to be found about a water system and not more than $200 for new material was required in the whole course of the work.

To illustrate that it pays for an engineer to be practical: Here is another example of the same principle, in which Mr. Mulholland is making a stream clean a reservoir which it had partially filled with silt. In January of this year it became necessary to make changes in the outlet of the Buena Vista reservoir, which has a capacity of 13,000,000 gallons, and it was emptied for the first time in fifteen years. Considerable silt deposits several feet in depth were found. These are now being cleared away by the use of the same principle, but with a reversal of the method. The silt banks within the reservoir are made into a soil saturated solution by the hydraulic jets playing upon them, are carried by the water to an outlet and washed through it into the river bottom.

SILVER LAKE RESERVOIR, LOS ANGELES WATER SUPPLY.

Hydraulic Fill Dam Under Construction. Silt-Bearing Water Between Embankments Which Are Raised By Shovels as Deposit Increases In Center.

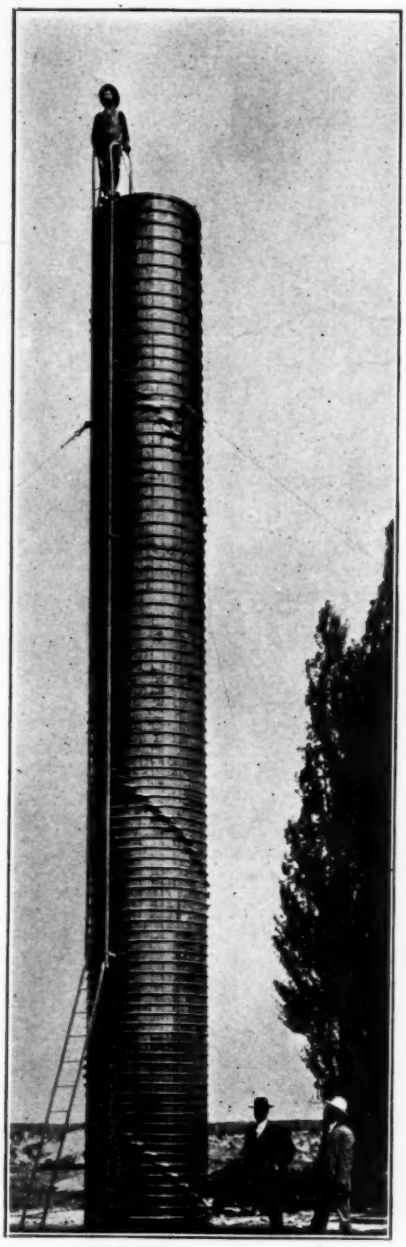
Machine-Banded Continuous-Stave Wood Water Pipe

By Frank C. Perkins, Buffalo, N. Y.

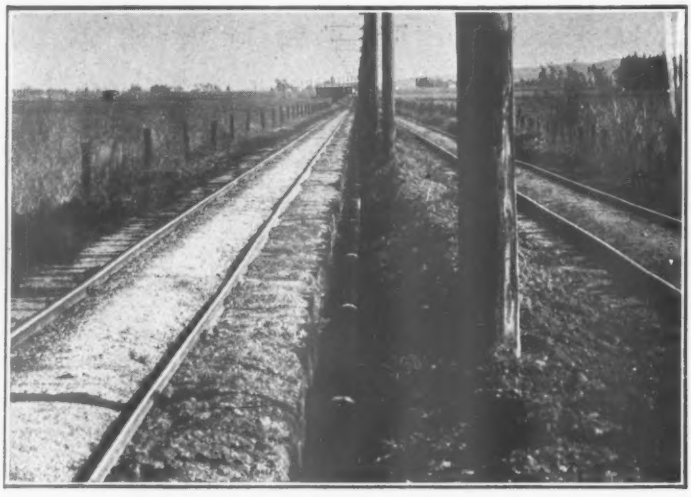
DURING the past decade many installations of wood water pipes have been put in throughout the West for city service, for irrigation and for hydro-electric power systems, as well as for stand-pipe service. An example of the latter use of wood water pipe is indicated in illustration, Fig. 1, which shows a stand pipe erected for the city water system of Walla Walla, Wash. This stand pipe was constructed 64 inches in diameter and to a height of 46 feet. It was made of continuous stave pipe and is used as a pressure regulator, there being an overflow pipe inside of the stand pipe. One of the advantages of wood pipe over cast iron or steel is that it is not affected by electrolysis and it is therefore of value when a pipe line must be installed near an extensive electric railway system. The accompanying illustration, Fig. 2, shows a 64-inch machine-banded redwood pipe which operates under a head of 150 feet along an electric railway line in the West and which was laid to replace a line of metal pipe that was completely destroyed by electrolysis in less than two years.

An inverted syphon is shown in the accompanying illustration, Fig. 3, used for irrigating purposes near Basin, in Wyoming. This inverted syphon is 48 inches in diameter and carries the water across the valley, following the profile of the country exactly with very little excavation, and indicates clearly the method employed in the Western States for conveying water not only for irrigation purposes, but also for hydro-electric power services.

An example of a 58-inch continuous stave pipe for the latter use is indicated in the accompanying illustration, Fig. 4, showing where the water conductor passes through the tunnel in the side of the mountain. This hydro-electric power pipe is more than 28,000 feet in length and conducts the water for operating the turbine in the electric generating station, which supplies current for the electric lights and for operating the street railway for the city of Walla Walla, Wash. The illustration shows one of the trestles on this line and one of the several tunnels through which the pipe runs on its way to the power plant. The lowest point on one of the trestles is under three hundred feet head, which is



1. CONTINUOUS WOOD STAVE STAND PIPE AT WALLA WALLA, WASH.



2. CONTINUOUS WOOD STAVE PIPE ALONG ELECTRIC RAILWAY.
Displacing Cast Iron Pipe Destroyed by Electrolysis.

equivalent to one hundred thirty pounds pressure per square inch. A remarkable incident, which shows the reliability of this form of water pipe, may be mentioned which is of special interest. The trestle at the point above mentioned in this pipe line during a freshet two years ago last spring was washed out, leaving the pipe suspended in mid-air for a span of 60 feet without injury to the pipe and without leakage of water. Of course this would be impossible with iron or steel pipe on account of its enormous weight, and shows one of the advantages to be gained by the use of the machine-banded and continuous-stave wood water pipe in addition to its low cost.

Cement Stucco

By Albert Moyer, New York City

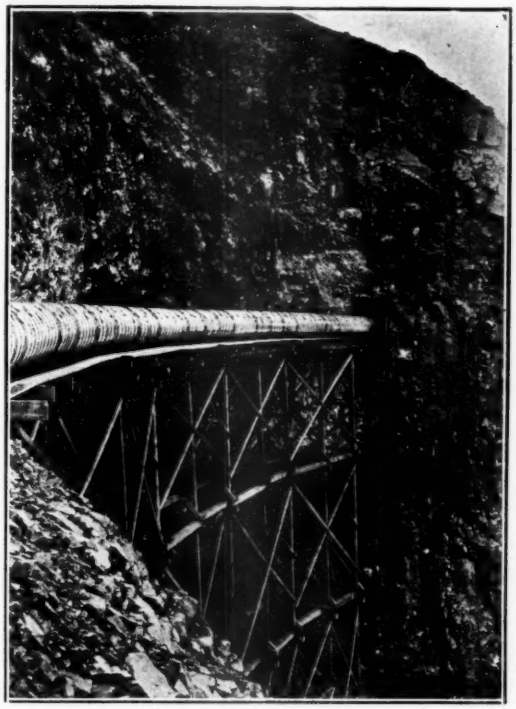
THE history of stuccoes does not furnish sufficient information and data to be of practical value in the manufacture of the present-day Portland cement stuccoes. There are records standing 350 years B. C. of stuccoes made from vastly different materials than are of economical use at the present time, and we find that such stuccoes were almost invariably used in the warm climates where the action of frost would not tend to disintegrate the rather poor material which was then available.

There is every reason to believe that originally these stuccoes were intended to cover up and protect inferior building stone and unburned straw brick. The archæology of stucco would tend to show that from an artistic standpoint this method of decoration was a development of the wattled buildings, which were plastered with clay and different muds hardened by being baked in the heat of the sun. Therefore, in this instance, the use of clay plaster over wattled houses was to protect an inferior building material.

Today stucco is used for a similar purpose, that of protection and pleasing surfaces. It would, therefore, seem advisable to recommend a material which would best serve the purpose of protection and artistic merit. Stucco or plaster should never be used as an imitation of other building material. "To cover brick with plaster and this plaster with fresco is perfectly legitimate, but to cover brick with cement and to divide this cement into joints that it may look like stone is to tell a falsehood, and is just as contemptible a procedure as the other is noble."

To carry out these ideas we desire to

3. CONTINUOUS WOOD STAVE PIPE INVERTED SIPHON.
Near Basin, Wyo.



4. CONTINUOUS WOOD STAVE POWER CONDUIT NEAR WALLA WALLA, WASH.

recommend only Portland cement stucco for exteriors, as this is the only hydraulic material which will stand the action of the elements.

From the artistic side we would also recommend such surface finish for stucco as will cause both natural color and pleasing texture. It would be well, therefore, to expose to view the aggregates used and avoid as far as possible exposing the bonding material—Portland cement.

There is no artistic reason for allowing only the bonding material to be displayed to the eye. On very large jobs the surface can be cleaned off by means of a sand blast, and on smaller jobs the surface may be cleaned, exposing each grain of sand, by means of muriatic acid in dilute solution, 1 part commercial muriatic acid, 4 to 5 parts clear water.

Where white aggregates are used the surface may be cleaned off with a solution of sulphuric acid, 1 part acid, 4 to 5 parts clear water. The sulphuric acid leaves a white deposit and therefore should not be used excepting where the aggregates are white.

Another method is to scrub the surface while yet green, say within 24 hours, with a house scrubbing brush and clear water. This is more difficult than the others for the reason that if the stucco is allowed to remain too long before scrubbing it will be too hard to remove the coat of neat cement from the outside of each particle of sand or other aggregates; and if scrubbed when it is too soft the surface may be damaged and difficult to repair.

If the character of the available aggregates will not present a pleasing surface when exposed the following surface treatment may be used: While the last coat is still thoroughly damp apply a Portland cement paint composed of 1 part Portland cement, 12 per cent. of the volume of the cement of well hydrated lime, pulverized form, and 1 part of the volume of the cement of fine white sand. Mix with water to the consistency of cream or the ordinary cold water paint. Stir constantly and apply by using a whisk broom, throwing this paint on with some force. Keep this finish surface damp for at least six days or longer if economy will permit. Do not allow it to dry out in any one place during the week. If necessary protect by hanging tarpaulins and using a fine spray of water playing on several times during the day by means of a hose. This will give a pleasing light gray color of excellent texture.

Stucco may be applied to various building materials. There is hardly any reason at the present time for stuccoing stone buildings. The procedure at best is difficult and hardly to be recommended. Our building stone is usually an excellent material and, therefore, does not require either protection or covering to produce pleasant effects.

New brick may be covered with stucco very successfully. The joints should be first raked out half an inch. The brick must be saturated with water. It is always best to start stuccoing at the top of the wall and work down between the pilasters or corners, finishing a whole strip or whole side wall from top to bottom in one day. Thus no streaks or cracks are formed where one day's work ends and another begins. By this method the wall can be kept wet ahead of the work by means of a hose. The second coat should be put on as soon as the first coat has stiffened sufficiently to hold in place and stand the pressure of the trowel. This second coat should be well scratched and the finish coat applied while the second coat is damp. The finish coat should then be kept wet, protected from the rays of the sun and as far as possible from drying out. This can be done by hanging wet cloths over same. This rule of keeping each coat moist until the other coat is applied and protecting after applying the finish coat must be observed in all forms of Portland cement stucco.

If the stucco is to be applied to metal lath or wire cloth the metal should be plastered on two sides so that it is entirely encased in mortar in order to avoid rusting. If this is impracticable then the metal lath or wire cloth should be dipped in a paint made of equal parts of neat Portland cement and water. Immediately after dipping the metal lath or wire cloth should be tacked onto a frame in the position it is intended to occupy. As soon as the neat Portland cement has hardened on the metal apply the first coat of stucco. Hair should be added to the mortar to be applied on wire mesh or expanded metal. One bag of cement, one pound of hair.

If plaster boards are used they should be nailed on the frame work of the building, leaving at least a quarter of an inch joint between each plaster board, this joint to be filled in with lime putty, otherwise each plaster board will cause square cracks on the outside of the stucco the size of each board.

A convenient method of waterproofing plaster boards is easily available.

The boards may be painted with two coats of any of the reputable bitumen waterproof paints to which plaster adheres. Then about 24 hours after the bitumen paint has been applied, and within six days, apply the first coat of stucco.

For stucco on terra cotta blocks great care should be exercised in keeping the blocks thoroughly saturated with water, for if the blocks are not saturated they will pull the water out of the mortar and it will crack and disintegrate. Portland cement requires water until it has thoroughly hardened, which ultimate hardening usually takes from 14 days to a month. It is not always necessary to play the hose on the wall for a month, although it would be advisable. The dews at night, the dampness in the atmosphere and the rain will furnish the necessary moisture provided the material on which the mortar has been plastered has not too great an affinity for water.

In order to prevent the porous hollow terra cotta tile from sucking the moisture from the stucco and also to furnish waterproofing and an additional bond other than that which would be given by the key, it is good practice to paint the surface well with two coats of bituminous paint, equal to such paints as Dehydratine, Minwax, R. I. W. or X-Hydro-Piastic. It is important that the first coat of stucco is placed over this paint after 24 hours and within six days.

Proportions for a good stucco should be 1 part Portland cement, 2½ parts coarse, clean sand, (If coarse, clean sand is not available use only 2 parts of sand). Add 10 to 15% of well hydrated lime, dry pulverized, of the volume of the cement.

If it is the desire of the owner or architect to use the exposed aggregate method, interesting natural colors can be obtained by using the following materials instead of sand, the same proportions. Green, red, buff, black or white marble screenings all passing a No. 8 screen and all collected on a No. 40 screen. These different colored marbles and different colored sand where obtainable, can be used singly or in a combination. When exposed by scrubbing or the acid treatment very interesting results are obtained.

In mixing stucco great care should be exercised to obtain the thorough incorporation of cement, sand and the other aggregates. The sand and cement should be mixed together dry until an even color results. This can be done by shovelling and raking while shovelling. Water should then be added, being careful not to add too much water at a time and not to get the resulting mortar too wet, so that more sand or cement has to be added. Be very careful to bring the resulting mortar up to the proper consistency for plastering.

It is advisable to add to the mortar from 10 to 15 per cent of the volume of the cement of well hydrated lime. This should be mixed dry with the cement and sand before the water is added. The addition of hydrated lime tends to fatten the mortar, making it more adhesive and impervious.

Another specification which we believe will prove of considerable value is by the addition of mineral oil to wet mortar. After the water is added and thoroughly mixed with the mortar add 15 per cent of mineral oil and remix. If a light effect is to be produced use white oil, such as Oil Petrole, manufactured by the Chesebrough Mfg. Co.

When the oil is to be mixed with the mortar it is always advisable to use hydrated lime as we thus have a larger amount of emulsifying material.

The color obtained by the scrubbing or acid method is limited only to the available sands or marble screenings. The color will be the color of the aggregates. An excellent green can be obtained by adding 8 per cent of the weight of the cement of chromium oxide. This should be mixed dry with the sand, cement and hydrated lime.

Always keep in mind that the surface to which the mortar is to be applied must be thoroughly saturated with water, each coat of stucco must be kept moist, and the final coat must remain moist for at least one week and longer if economy will permit.

Stucco should not be troweled to a smooth surface. The artist painter would never think of smoothing the paint on his canvas by means of a straight edge. Texture and color are necessary if artistic results are to follow. By using the suggestions above outlined, the architect is privileged to select the aggregates from which the stucco is made and has in fact as great play in the planning of the color, tone and texture as has the artist in mixing the paints on his palette.

Water Rates and Records at Valparaiso, Ind.

By E. L. Loomis, Superintendent of Valparaiso Home Water Co.

PRIOR to January 1, 1910, the maximum charge for water by meter measure at Valparaiso was thirty cents per thousand gallons, with a sliding scale downward and a minimum monthly charge of one dollar.

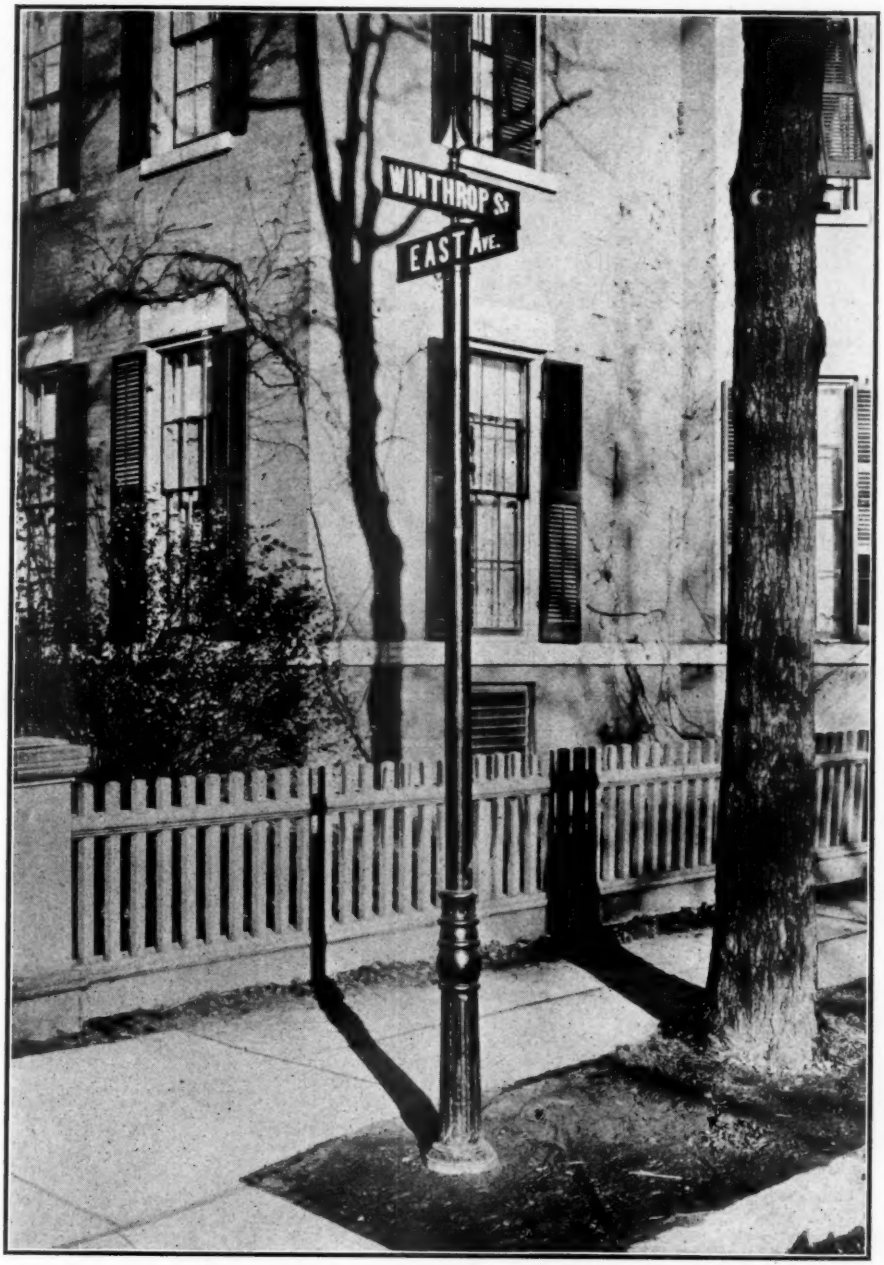
Residences not provided with meters were on a flat rate, the charge for service being based upon the number of rooms and fixtures. For a dwelling of four rooms or less the charge was $5.00 per year, which entitled the consumer to hot and cold water at sink in kitchen. For a five-room dwelling the charge was $6.00; for six rooms, $7.00, and so on up. All fixtures other than at sink in kitchen were assessed as extras. For example, a bath tub was assessed $4.00 per year, closet $4.00, lavatory $2.00, sill-cock for full lot $6.00 for sprinkling season, etc. The rates charged on other fixtures were proportional with those named, likewise for properties other than residences.

The engineer's daily reports, which go regularly to the files of the office, indicate water and steam pressure, noted hourly, pumpage in gallons, pump counter readings and amount of coal consumed each day. A very complete small laboratory for bacteria, alkalinity and presumptive coli tests has been installed, and reports of daily analyses are made. These reports are tabulated and systematically filed.

Applications for water service are made in the usual way, signed by the applicant and kept in a book made for that purpose. The card index system is employed entirely, not only for service records, but for all accounts with consumers, meter readings, etc., as well. Water rate accounts are kept in alphabetical order, while the service records are filed numerically, thus making each a ready index to the other. Items of cash receipts are kept in a special ruled cash book, each line of which is numbered. This line number is triplicated, the corresponding number being given to consumer's receipt for payment made, and to receipt stub. Thus a three-fold and very effective check against error is employed. At the close of the day's business the cash book is ruled and footed, and the results carried in totals to the receipts of the general cash book. Should any sundry items appear for which special ruled and headed columns are not provided, they are carried forward into general cash book separately to be posted to the ledger. All invoices and bills are filed numerically in invoice books, the corresponding number to each being given to disbursement line in general cash book and to voucher check as issued in payment of bill. The general cash book is ruled and footed monthly for purposes of comparison only, thence the footings are continued forward until the close of the semi-annual period, at which time they are posted to the ledger. How satisfactory and accurate this system of receipts and disbursements has been may be inferred from the statement that not a single error in accounting has been disclosed since it was installed. It combines the good qualities of being easily used and understood, quickly audited, of ready reference, and, above all else, of reducing the liability of error to the minimum.

Next to rendering the public good service, a waterworks manager delights in the knowledge that his busi- is a "going concern," and he should at all times know exactly to what extent it is a "going concern." To do this requires an accurate and convenient system of records and accounting, without which few enterprises can permanently prosper. "Eternal vigilance is the price of success" just as truly in the water office as anywhere else, the principles of success in the waterworks business being synonymous with the principles of success in any other line of work. It comes, if it comes at all, only to those who deserve success, and it cannot be deserved save at the expense of constant attention to the details and duties of the hour. Let the meter department, for instance, pass by unnoticed for but a single month and the losses will begin to grow. In our plant this department is observed most vigilantly. Meter tests are frequently made and accurate records in detail maintained. Imagine our surprise soon after this system of inspection was installed of finding many meters under-registering from 50 to 70 per cent. Frequent inspection of flat rate fixtures also is amply rewarded by reduced pumpage

*From a paper before the Indiana Sanitary and Water Supply Association.



I. STREET SIGNS AND SUPPORTING POST, ROCHESTER, N. Y.

on account of waste and leakage. By such tests and inspection with us the total pumpage has been steadily reduced for several years, notwithstanding a healthy growth in new consumers, additional fixture installations, etc.

To such a marked extent has the business grown that it has been possible for the rates to consumers to be reduced. Beginning January first one dollar per year was deducted from the charge against every flat rate residence in the city. Fixture rates remain unchanged. Thus, the flat rate householder, who formerly paid $5.00 per year, now pays $4.00; he who paid $6.00 now pays $5.00, and so on. The maximum meter rate was reduced to twenty cents per hundred cubic feet, which amounts to the very small sum of six and two-fifth cents for each ton of water delivered. The minimum monthly meter charge, instead of being one dollar, as heretofore, is now but fifty cents.

By this method of reducing rates two very desirable objects will be observed to have been accomplished. First, the inducement held out to every flat rate consumer whose water costs him more than $6.00 per year to meter his service, thereby reducing pumpage on account of waste and leakage, and conserving the water supply. Second, to give to the very small householder, who cannot afford a meter, an exceedingly low rate. This latter may not be profitable from a financial standpoint, but it does possess the virtue of being good humanity at least.

The ideal system, the writer is aware, is the wholly metered system. But ours is not an ideal system. We are struggling along, as best we know how, to make it such for our people, but that end is not yet in view.

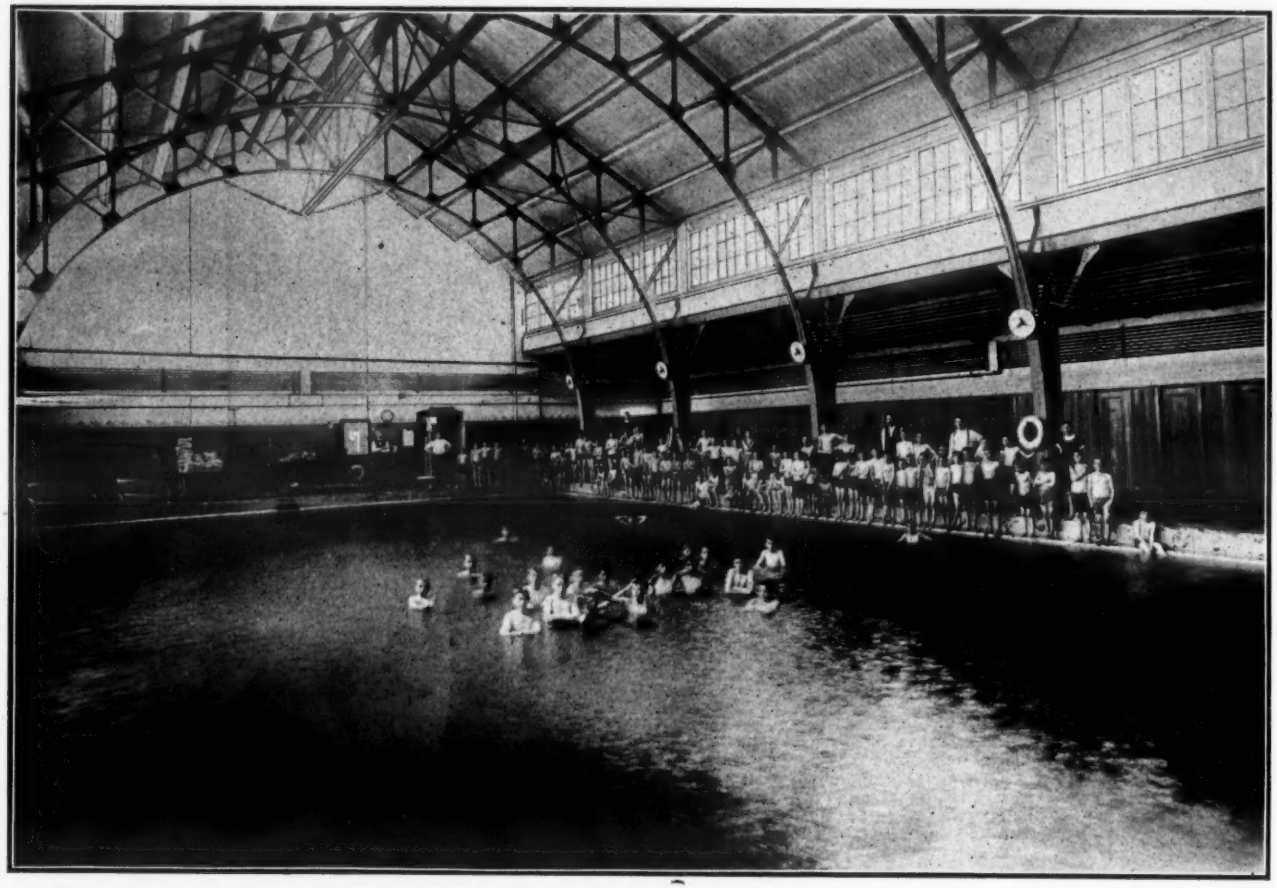
Meters are indeed valuable adjuncts to a waterworks enterprise. So is a good system of records and accounts. Likewise, is the question of rates a vital one. But uppermost of all in supreme import to a community is the question of service. Not only to render satisfactory service, but the very best service, should be the laudable ambition and watchword of every waterworks man. Not so much cheaper water, but better water, is the crying need of the hour. Water is the prime necessity of human life. With seeming prodigality has nature lavished upon us this immeasurable, unthinkable blessing for the use of man. And he who helps to conserve it and safeguard it and to pass it, pure, to the lips of the multitudes of his fellow-beings renders a service to the world as exalted as it is distinct and worthy.

Brick Pavements in Rochester, N. Y.

THE first brick pavements in Rochester were laid in 1890, aggregating about 1.5 miles. At the end of the year 1899 there were only about 5.5 miles, and a total of 11.38 miles in 15 years, or an average of ¾ of a mile per year. During the next four years, however, ending with December 31, 1908, about 33 miles were laid, or an average of about 8.25 miles per year. There are now 41 miles, or 645,000 square yards, of brick pavement. Brick pavements are now 22½ per cent. of the total paved street, the percentage having increased from nothing in 1900 to 5 per cent. in 1904 and to 22½ per cent. as stated at the present time. This exhibit certainly offers great encouragement to the paving brick industry.

Mr. E. A. Fisher, the city engineer of Rochester, recently called special attention to some of the points in regard to brick pavements in the city, stating that the city charter permits the common council to provide in an ordinance for pavements for the construction of any necessary local sewers, also sewer laterals and water services. It is also the practice to include in the same contract the trenching and back-filling for any water mains required. The electric light company and the telephone companies are required to construct the necessary conduits, and the gas company to lay the necessary mains, all in advance of the improvement; the work to be done either by the same contractor that lays the pavement, or under his supervision as to refilling trenches. In this way the entire responsibility for the integrity of the subgrade is upon the contractor, and his guarantee is not complicated by the work of others over whom he has no control. The minimum future disturbance of the street is also provided. This practice, he believes, is one of the points of perfection in a brick pavement.

It is the practice to put in the foundation for the street railway tracks and lay the pavement in the portion of



II. SWIMMING POOL, ROCHESTER MUNICIPAL BATH HOUSE.

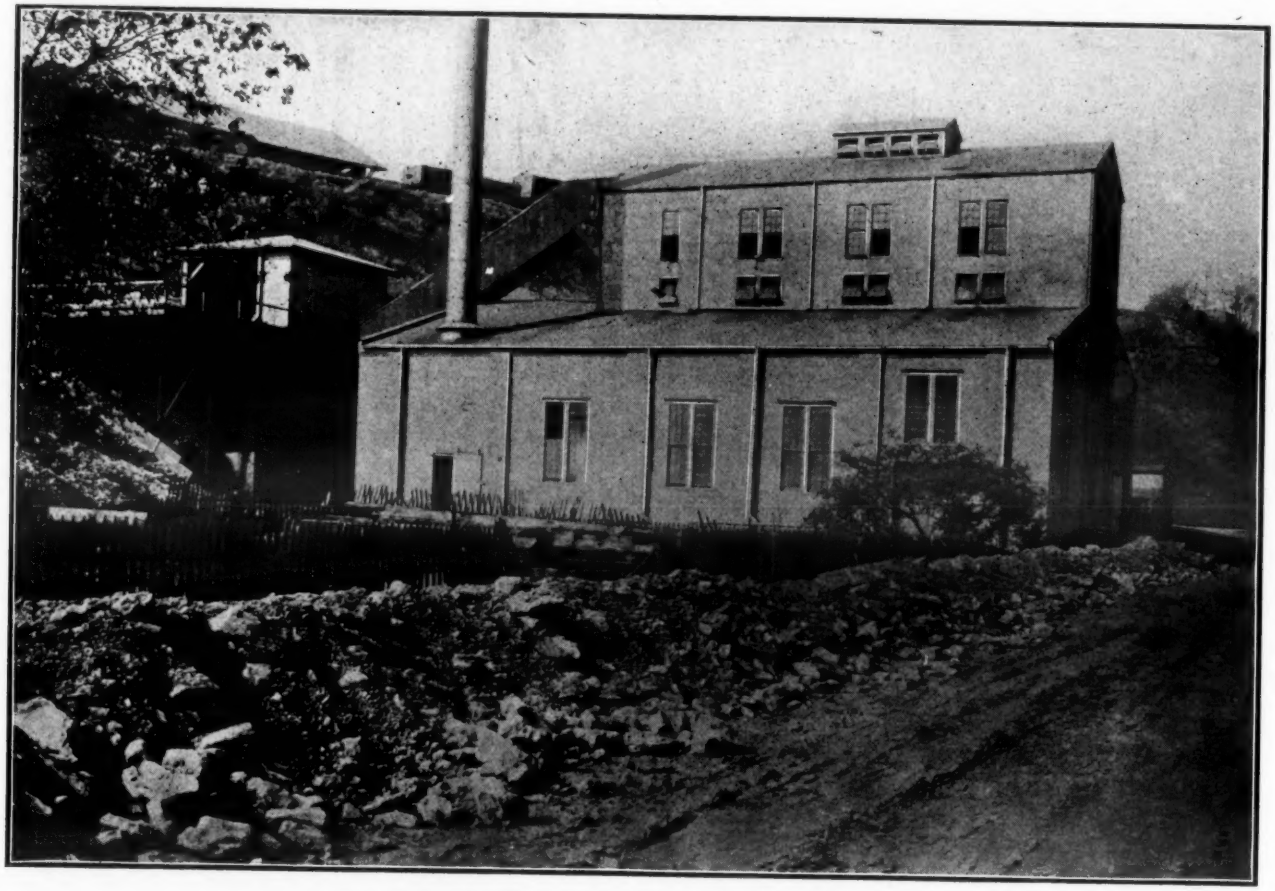
the street that the railway company is called upon, by statute, to maintain. It is the practice to provide a concrete foundation at least 6 inches thick for brick pavements in public streets. Even with the best of care in back-filling trenches and the most thorough rolling or tamping, some small settlements are bound to occur. The 6-inch foundation will successfully bridge such settlements. Experience teaches that it is better to do all the underground work above specified at the same time as the pavement is put down, and that it is a positive disadvantage to have such work done by another contractor, even if several years elapse before the pavement is laid. The worst settlements that they have had in paved streets have occurred over sewers laid from eight to ten years prior to the putting down of the pavement, where the surface was crowned up so as to shed water and the back-filling, except for a very limited distance from the top, received no consolidation whatever.

Mr. Fisher emphasizes some points made by Mr. Blair, the secretary of the National Paving Brick Manufacturers' Association, such as the method of providing expansion joints at the curbs by placing a board of proper thickness next to the curb and allowing it to remain from 24 to 36 hours after the pavement has been grouted, and then, after removing the board, fill the joint nearly full of paving pitch with a coating of sand to protect it from the sun. This method is much superior to the prevalent practice of pouring the paving pitch first. Some very serious damage has come to good brick due to the fact that the paving pitch in the expansion joint crosswise of the street had settled and the grouting filling the top of the surface of the joint had broken the tops of the brick for from one to three courses each side of the expansion joint. This bit of carelessness on the part of the contractor's foreman and the inspector gave the brick an undeserved bad reputation. He especially commends the portion of Mr. Blair's specifications relative to the grouting of the pavement, to contractors laying and guaranteeing brick pavements. The extra care required to do the work properly, as described, will be repaid a hundredfold by the greater durability and freedom from repairs during the life of the guarantee, and by the satisfaction of the residents with the quality of the work.

The committee of the N. B. M. A. recommended 20 per cent. maximum loss from abrasion in rattler, This percentage has been found, in general, to give a very good quality of brick. Mr. Fisher believes, however, that the limit should not be an arbitrary one, but it should depend largely upon the character of the traffic on the street in question. For streets of heavy traffic brick showing not more than 15 or 16 per cent. abrasion should be required, while for unimportant streets or roads, or for gutters in macadam streets of light traffic, a 24 per cent. brick would be satisfactory. He would advise a brickmaker not to furnish brick to a contractor for a street having heavy traffic under a specification only suitable for a street of light traffic. The loss to the brick industry as a whole by the use of such brick is beyond computation, and examples thereof are numerous. One example illustrative of this point is found in a brick pavement laid on East avenue in the year 1891 by one of the best paving contractors in the city, and at that time laid in the best manner known to the trade. This pavement remained in good condition for about eight or nine years, after which it became very rough, and later was worn so badly in the center of the street that it was necessary to make quite extensive repairs. The brick eventually became worn to a thickness of about 1½ inches, when it was impossible to repair with new brick and the repairs for the last three years the pavement was maintained were by filling up the holes with asphalt where the brick had worn entirely away. Some of the best of these bricks were tested in the rattler and gave results of about 23 per cent. The average was much greater. The brick was altogether too soft for the traffic passing over this street. The same brick was laid on a residence street of light traffic, by the same contractor, in the same year, and is now, after 17 years' use, practically in as good condition as when first laid. The joints were filled with paving pitch instead of cement grout.

Another example: A brick pavement was laid on a portion of East Main street in the year 1898. Some of this brick was taken up and tested during the year 1907, after 9 years' use in the street, and showed a little less than 14 per cent. abrasion in the standard rattler. The pavement, although subjected to rather heavy traffic, showed no appreciable signs of wear during its 9 years' use. The pavement was made of wire-cut brick laid close and well grouted.

The question of whether a pavement should be guaranteed at all is one that



III. GARBAGE REDUCTION PLANT AT ROCHESTER, N. Y.

has received recently a great deal of consideration from municipal officers. In Rochester, on account of the large amount of underground work done, it is desirable to have a guarantee of sufficient length to show whether the back-filling has been properly done and also that any defective brick may be discovered. The general ordinance of the common council, under which all pavements are laid, provides that they shall be guaranteed for ten years. This practice arose about 12 years ago, when the department had no facilities for testing asphalt pavements, and it was decided, upon the recommendation of the city engineer, that an asphalt pavement should be guaranteed for ten years. It was not his intention at that time that other pavements that could be inspected and passed upon as to their wearing qualities should be included in this guarantee. The builders of asphalt pavements, however, represented to the common council committee having the matter in charge that it was unfair for them to guarantee their pavements for ten years and to permit other pavements to be laid under a less guarantee.

The city now has provided itself with proper apparatus for testing asphalt pavement, as well as other kinds of pavements, and it is no longer necessary that the ten-year guarantee should apply. The general practice is to reduce guarantees to at most five years, and it has been recommended that this change be made in the general ordinance. It is a mistaken idea of some taxpayers that they are getting something for nothing. The general result, however, is exactly the contrary. As a general rule in the long term guarantees they pay for something and get nothing. No contractor who knows his business will accept of a long-term guarantee for maintenance without a sufficient addition to his bid to cover all contingencies. A five-year guarantee is all that is necessary to determine whether the work and material comply with the specifications.

Special Services to Rochester Citizens

The street sign is a problem to which a generally accepted solution has never been found. Tastes, customs, conditions of street corners, funds, all vary and the individual sign is so small that it is usually considered unimportant. That it is very important is recognized by every traveler who wishes to find his way about a strange city, and sometimes by a citizen trying to find some one in an unfamiliar part of his own city. One of the styles of sign used in Rochester, N. Y., which is wholly independent of any local conditions except room to set it where it can be seen, is shown in the first of the accompanying photographs.

The swimming pool in the public bath house is shown in the second photograph. This bath house has gradually grown from a remodeled small building. The swimming pool, 46 by 80 feet, 3 feet deep at one end and 7 feet at the other, was constructed in the rear of the bath house in 1905. In 1906 the pool and some additional space was enclosed by a brick wall and the roof was put on it. This is followed by an addition to the swimming pool enclosure to provide dressing accommodations for men and women and a heating plant for water and buildings so that the pool can be used in the winter also. Nearly 70,000 baths are taken in a year, nearly one-eighth being taken by women.

The third photograph shows the garbage reduction plant, which was put up by the Genesee Reduction Co., under a five-year contract, by the terms of which the city pays some $65,000 a year, including inspection and other general expenses, for the collection and destruction of the garbage. The plant is within the city limits, and the company is required to conduct it without nuisance.

EDITORIAL COMMENT

Determination of Qualifications of Engineers.

Depreciation and Sinking Fund Accounts.

DETERMINATION OF QUALIFICATIONS OF ENGINEERS.

The following editorial appeared in a recent number of *Surveying and the Civil Engineer*, a youthful English periodical:

Our American contemporary, MUNICIPAL ENGINEERING, in discussing the introduction of a bill in the New York Legislature, which proposes to license civil engineers in that State, plumps for the examination test for determining the qualifications of engineers seeking employment from State, county, city, or board having charge of public construction work. The character of the machinery for carrying on this work must, it says, be determined according to the necessities of the case in any given State. In New York, where there are great engineering organizations within the great city and other great engineering organizations in charge of State boards and departments, there must be a more flexible central organization than in a State where the engineering work is less extensive and the principal offices to be filled are those of city and county engineer and their subordinates, and an occasional engineer of a State or county or city board.

A State board of examienrs of engineers is the most obvious director of such an organization, and it should, in our contemporary's opinion, be given considerable leeway, although some restrictions upon its action would undoubtedly be desirable. It is only intended here to suggest this protective measure for the State as the one most easily defended, the one most readily carried through the Legislature. The adoption of such a plan would, it considers, have a most salutary effect upon the engineering profession in general. If the methods of putting names of competent engineers on the lists for the various grades of appointments are as good as they should be, the certificate of eligibility will be the best evidence an engineer can have of his technical standing, and the State's examination will be taken by many who do not expect to seek public employment, simply that they may have the certificate of attainment. Employers will soon come to demand such certificates as evidence of competence. Such voluntary examinations as have been devised by organizations of engineers in England show that this will be the effect. The only problem is to secure a competent examining board with a reasonable set of instructions by the Legislature.

We in this country have no desire to see a State examination. The organizations of engineers referred to are quite capable of running their own examinations; indeed, we are getting badly bitten by the examination craze, and a ten-year interregnum would be of considerable use in giving many a really capable man a chance of showing his worth. With voluntary examinations we have no fault to find. If a man cares to waste a couple of years of his life in cramming himself with mental food which he must disgorge on the first opportunity, he is perfectly at liberty to do so. He can recover lost ground afterwards, if he has not gone too far. The ill-effects of a course of tuition in road construction may be minimized by a couple of hours' run on a steam-roller, and a 'swot' for the examination of one of the sanitary bodies may even become a matter for self-congratulation when the relative positions of the socket and spigot end of a drain-pipe are clearly understood. The real value of an examination lies in the incentive it gives to study. The man who might never otherwise open a book is compelled to burn the midnight oil; but would it not be much better if the incentive were self-improvement without any question of reward? The evil is especially noticeable in the case of the scholastic profession. There, every one has to pass an examination of some sort or another, and it is really surprising how appailingly very seldom either one or the other opens a book when once the need for study has passed.

Our English contemporary is evidently in almost complete accord with

the position taken by MUNICIPAL ENGINEERING, and gives the experience with the English form of voluntary examinations as the basis for the objection of English engineers to a compulsory State examination, and thus supports the objection made to the proposed New York statute subjecting all engineers to examination.

The State has an undoubted right to protect itself and the municipalities and boards created by it from the consequences of incompetence in their officials. Too many of these officials are unable to judge of the qualifications of technical employes, and there will be a very material improvement if their power of choice is limited to a list of men declared by a competent State board to be competent for the work for which they seek employment. Whether these qualifications should be determined by a scholastic examination or by an examination of the work done by the candidate or in part by each should be left to the judgment of the examining body, as it is in the case of the U. S. Civil Service Commission's examinations of engineers for special services. But with a competent State Board having sufficient authority over its modes of procedure, an eligible list can be formed, which will have names of practical engineers, classified according to the demands of the various kinds of service. One of the principal reasons for incompetence in municipal engineering work will thus be removed very largely.

The examination is voluntary in the sense that no engineer need take it who does not wish to, and it is thus agrees with the position assumed by the English engineers. But if an engineer desires municipal, county or state employment he must secure a place on the eligible list for the class or classes of employment which he is seeking, not so much for his own benefit as for the protection of the municipalities from engineering incompetence or rather from the ignorance of the employing officials as to what constitutes a competent engineer. A competent board will soon establish a reputation for choosing good men for its lists, and most engineers seeking general employment will find it to their advantage to put their names on these lists. Thus the engineering profession will secure the benefits of standards of qualifications without the disadvantages of the more perfunctory and mechanical administration of a compulsory law covering the entire profession, while the State and its subsidiary corporations and boards will secure the protection, the need of which is now so often and so strongly demonstrated.

DEPRECIATION AND SINKING FUND ACCOUNTS.

A recent discussion of depreciation in water-works accounts with reference to uniform reports, by the New England Water Works Association, a report of which appears in the June number of the journal of the association, suggest an extension of the discussion which appeared in MUNICIPAL ENGINEERING for January, vol. xxxviii, p. 33.

For the purpose of securing uniformity in municipal reports it is necessary to determine a method of keeping accounts of depreciation and to follow that method without reference to any other account, but when the ultimate results of the operation of a plant are desired, the figures obtained from this account must be modified by the results of the sinking fund and bond accounts, due attention being paid to methods of investing money in the plant other than borrowing it by the sale of bonds. The intimate relations of these sets of accounts, capital stock, bonds, sinking fund, depreciation are shown in the editorial above referred to.

The Association discussion was opened by Harry S. Chase, a certified public accountant who has had several years' experience as superintendent, treasurer and manager of water and gas plants, and was restricted to the depreciation accounts, although it ranged some distance from the relation of these accounts to uniform reports.

Mr. Chase quoted the instructions of the U. S. Census department regarding depreciation accounts in reports to that office, and outlined the various items of the blank for reports, which are the same as those given in the report of the committee on a uniform system of accounts and reports of the American Water Works Association, which is reviewed in vol. xxxviii, p. 333. He criticised the forms in that they do not provide for depreciation reserve accounts in the list of liability accounts.

Mr. Chase seems to recommend the formation of this account by setting aside at regular intervals, say monthly if balances are taken at such intervals, assumed percentages for depreciation of the various classes of assets provided for in the uniform report blanks, these sums forming a fund against which should be charged the cost of such renewals as are properly chargeable to depreciation, as distinguished from new construction, which is charged to capital, and maintenance and repairs, which are charged as expenses of operation payable directly from the operation receipts each month.

If the assumptions of life of the various parts of the plant are correct, these renewals chargeable to depreciation might theoretically occur at the ends of the periods of life and the depreciation reserve fund to equal the cost of renewal would be made up by the annual setting aside of a sum which, with the interest on the investment, would amount to the cost of the renewal. Practically the renewals take place at intervals during the life of the plant, so that there must be withdrawals from the depreciation reserve fund before the end of its period, and its treatment like a sinking fund for the retirement of bonds at maturity will not be quite correct. For simplicity we may assume with those participating in the discussion that water works depreciate as a whole during a life which averages 50 years. A sinking fund would require an annual addition of less than 2 per cent to renew the plant at the end of the fifth year. If the depreciation were at the uniform rate of 2 per cent a year and could be taken care of each year, a depreciation reserve fund would not be required, and 2 per cent of the cost of the plant would be set aside each year from the reserve to take care of the depreciation of the year. The actual fact will lie between these two extremes and an appropriation of 2 per cent of the cost of the plant each year to the depreciation reserve fund, if placed on interest, will more than meet the total withdrawals for renewals during the fifty years assumed life of the plant and turn the plant over as a new plant to the succeeding term.

It should be noted that the amount set aside for the depreciation reserve fund each year, considered in this way, is two per cent of the cost of the plant, and should not be computed on the value of the plant each year.

If there is a bonded indebtedness on the plant, some provision should be made for retiring this indebtedness when the bonds become due. A sinking fund to extinguish the debt at maturity is the logical method.

Now if the plant is built out of the proceeds of the sale of stock, or other direct investment of capital, there will be no sinking fund and the depreciation reserve fund will take care of renewals and will turn over the equivalent of a new plant at the end of the period if it is assumed of correct length.

If the plant is built out of the proceeds of the sale of bonds and is like the "one hoss shay," no depreciation fund will be necessary, for the sinking fund will retire the bonds when they mature and the plant will disappear, leaving the field open for a repetition of the procedure. But one of the funds is necessary therefore, and if both are kept in full operation for the full assumed life of the plant, it has been paid for twice and there is a profit of 100 per cent on the original investment in addition to whatever dividends or interest may have been paid during the period.

In any given plant the investment is doubtless partly of original capital and partly of borrowed money, so that both

depreciation reserve and sinking funds must be maintained, but both should not be computed on the total cost of the plant, but rather upon the proportion of the value belonging to each.

Since the plant must be kept running and left in first class condition at the end of the period, in the case of the bond issue for the total cost there must be some method of making the renewals that will be necessary before the end of the assumed period of its life. These might be provided for by new bond issues, by making the terms of the bonds less than the assumed life of the plant, or drawing from the sinking fund with the expectation of refunding the bonds, when due, to the extent of these drafts. For, if the plant is to continue to run in first class condition indefinitely, without the break assumed in the theoretical "one hoss shay" case, the bonded indebtedness can not diminish, but must remain continuously equal to the cost of the plant.

If equitable rates for service are to be insured, the above considerations must be taken into account in fixing them, for evidently the 100 per cent profit indicated under the assumption of the maintenance of both depreciation reserve and sinking funds computed on the total cost of the plant belongs to the consumers in a public service plant and not to the owners of the plant, whether they are private investors, who have already received the interest on the investment and the equivalent of its return to them, or are municipalities, whose general funds are no better entitled to the excess of income over proper returns on the capital invested.

If the depreciation reserve and sinking funds have been kept up to the proper amount, the value of the plant, for purposes of sale, as well as for purposes of computing rates for service, will be its original cost, including in that term all the additions to its first cost on account of extensions, new plants and such parts of renewals as are real additions to the value of the plant beyond the replacement of the outworn or outgrown part. If they are not kept up, then the value of the plant must be less than its cost by some amount representing the depreciation and the bonded or other indebtedness, with such additional allowance for failure to maintain the sinking fund as the cost of securing the necessary funds to take its place may show to be equitable.

There has been a tendency to compute the depreciation in a plant as a certain percentage of the value, deducting this depreciation for a year and adding the cost of new construction during the year to give the value of the plant on which depreciation for the following year is to be computed. The above course of reasoning throws doubt on the correctness of this process, which diminishes each year the amount set aside for depreciation reserve, while the actual depreciation is increasing each year until the time of renewal arrives, and in a plant without growth or expansion would ultimately wipe out the allowance for depreciation entirely.

These arguments assume that the rewards for good management of the plant have been taken care of by permission to declare larger dividends upon stock than it would be necessary to pay for interest on bonds, by allowance of a proper amount of stock, on which dividends may be declared, beyond the cost of the plant, or, particularly in municipal plants, by increase in salaries of managers or by transfers of surplus to the city treasury, and that these evidences of capital investment are not included in the computations of depreciation or sinking fund allowances.

THE QUESTION DEPARTMENT

Thickness of Retaining Wall.

Having little experience in heavy concrete work, I will ask your opinion as to proper thickness of wall, diagram of face enclosed.

I think ledge of rock will be found for foundation of middle section. Good stone culvert, in use for years,, will remain. I have suggested a batter of 1½ inch to 1 foot for outer face. Also reinforced construction, at least for higher sections.

A forty-foot street will be supported by wall, but with the exception of triangular section resting against wall, earth has been settled by many years' travel, if that amounts to anything.

J. A. W., ———, Mo.

The wall shown in the diagram is 168 feet long and has a maximum height of 30 feet, being composed of a section 70 feet long, varying from 5 to 10 feet in height, one 10 feet long and 20 feet in height, one 60 feet long and 30 feet in height, another 18 feet long and 20 feet in height, and another 10 feet long and 5 feet in height. The section of the 30 foot wall scales about 4 feet thick at the top and 8 feet at the bottom, with vertical back and the batter named above on the outside. The section also indicates rather indefinitely a filled street back of the wall with a present slope whose toe is near the location of the front of the proposed wall, so that the wall will sustain the earth to be filled into the approximately triangular space bounded by the present earth slope of the road, which is slightly curved, the back of the proposed wall, and the new earth surface at the level of the top of the wall. Presumably there is a similar wall on the other side of the road.

Have our readers any suggestions to make?

The problem seems to be that the usual retaining wall acting by its own stability, made up of weight and foundation base, the concrete takes the place of stone masonry, with the probable advantage of being monolithic. The ordinary rule for the thickness of a retaining wall with good foundation and ordinary filling is to make it one-fourth to one-third the height, where the batter is one in eight, as in the present instance. The above described wall lies between these limits, but quite close to the lower, so that a good foundation would be necessary for the highest part.

Some reinforcement near the face will reduce the probabilities of large cracks and will also add to the stability of the wall.

Value of Sand for Sidewalks.

Please find inclosed sample of sand that is in gravel here.

The gravel is a hard, flinty kind, but I was not just sure about the sand, so please give me some advice on same. Does the color hurt anything? The gravel and sand is to be used in concrete walks. This sand inclosed is a natural deposit in the gravel out of a bank. Any information will be appreciated.

N. B., ———, Ark.

The grains of sand seem to be quartz and flint similar to the gravel, and they are more or less cemented together by iron oxide. When water is added and the mixture is agitated most of the sand turns out to be very fine, some of it extremely so, and the proportion of this fine sand and the mud, which has probably some clay with the iron oxide, proves to be too large for use in the wearing surface of cement walk. The proportion of fine sand is too great for strength, and the grains of sand are too many of them coated with the iron oxide to make a good mortar or concrete. The surface of the walk would doubtless pit and discolor and would probably not be durable even if not subjected to much wear. A contractor would not be safe in guaranteeing a walk made with material as dirty and as fine as this sample of sand. It is doubtful whether it would pay to wash the sand, the proportion of loss being so great, but the small remainder after removing material that is too coarse and too fine would probably be reasonably good material.

Noise and Dust Nuisances.

This city desires to enact legislation looking to the doing away with unnecessary noises and dust. I understand that some of the eastern cities have been taking up the matter of unnecessary noises and I desire to know what they have been doing in order that we may enact an ordinance which shall be as nearly as possible a model one.

J. P. Wood, City Attorney,
Pasadena, Cal.

There has been some discussion of the matter of suppression of unnnecessary noises, but little of it has crystallized into state or municipal legislation. The municipal incorporation act of Indiana has as liberal provisions in this regard as are usual, and it is more specific than can be found in most states. They give the council power "to regulate or prohibit the use of hand-organs or other annoying instruments of any character, or other

music of itinerant performers in the streets, alleys or public places of the city"; "to prevent or regulate the use of fire-arms, fireworks, bonfires or other things or practices tending to endanger persons or property"; "to regulate or prohibit the ringing of bells, crying of goods or sounding of steam whistles."

An ordinance of the city of Indianapolis putting into effect part of the above authority is as follows:

An ordinance declaring it to be a nuisance to use or blow tin horns, trumpets, locusts, rattles or other instruments for the sole purpose of making a noise upon the streets, alleys, highways or public places within the city of Indianapolis; fixing a penalty for the violation thereof, and fixing a time when the same shall take effect.

1. Be it ordained by the Common Council of the City of Indianapolis, Indiana, that every person who shall use or blow (as above) shall be deemed and be held to have committed a nuisance; and every person guilty of violating the provisions of this ordinance shall be fined in any sum not exceeding $50, to which may be added imprisonment for any period not exceeding 30 days.

2. Publication provisions fixing time of going into effect.

There are similar ordinances regarding the sounding of railroad whistles, auction bells, etc.

The ordinance in Seattle, Wash., regulates the blowing of locomotive whistles within defined limits, letting off of steam, flat wheels on street cars, greasing of street railway curves, advertising noises, except bands of music, transportation of iron in a noisy manner, church and other bells.

The average city ordinance prohibits undue noise by persons in the street and the use of fire-arms or fireworks with certain exceptions and really affects nothing which is not otherwise classed as disorderly and so is subject to police control.

A sea-side suburb of New York has taken care of the noises of junkmen by charging a license fee of $5, which is increased to $50 if they make noises with bells, shouts, or otherwise. Hucksters and the like are charged $5 for wagon or $2 if on foot, the fee being trebled if noises are made to attract attention at a distance.

Newark, N. J., prohibits phonographs being directed toward open doors or windows.

Cleveland, O., has an ordinance prohibiting sounding of locomotive whistles, vessel whistles, stationary engines of factories and the like, for anything except warning of danger, of fire, collision or other imminent danger, and definitely prescribes the whistles for steam tugs.

Congress has passed a law giving supervising inspectors of steamboats power to regulate the whistling of boats on water under their jurisdiction, which is said to have eliminated eighty-five per cent of the noise due to this source.

New York prescribed a quiet zone, prohibiting street music or hucksters cries within one block of a church, hospital, or school between 9 and 4, but its provisions are so indefinite that it is not enforced.

Part of the above information is taken from a new book on "The Health of the City," by Hollis Godfrey, ($1).

Can our readers give any information concerning laws or ordinances governing objectionable or unnecessary noises?

Calcium Chloride as a Dust Layer.

Have you published anything in your magazine relative to the use of chloride of calcium on highways, or can you refer us to any work on road construction which covers the use of this material?

J. P. G., Saginaw, Mich.

Judson's "Road Preservation and Dust Prevention" ($1.50) gives some instruction on the use and value of calcium chloride for preventing dust on roads. Hubbard's "Dust Preventives" ($3) goes into a little more detail on this subject as well as all other methods of preserving road surfaces.

An article in MUNICIPAL ENGINEERING, vol. xxxvii, p. 236, contains much of the same practical information. One on "Dust Prevention by Chemicals" in vol. xxxv, p. 175, gives the results of tests on various roads and describes briefly methods of application. Another on p. 183 of the same number gives the methods and results of a test in the grounds of the Agricultural Department at Washington, D. C.

Street Railway Track Construction in Brick Street.

A street railway company has just asked for a franchise through our streets. Much of our street is paved with brick on 6-inch concrete foundation and 2-inch sand cushion and the remaining street will be paved at the time the track is put down. What foundation would you suggest under ties? What kind and spacing of ties? What provision for bonding rails? What weight and section of rail? Would you suggest special brick along rail? Would it be possible by using a special track fastening to use 60-pound A. S. C. E. section and is there such a track fastening on the market?

Most of the track will be single track in a 36-foot pavement. We desire to have a first-class construction without making the conditions too burdensome to the company and at the same time protecting the best interests of the city.

P. B. W., ———, Ill.

In the March number of MUNICIPAL ENGINEERING, vol. xxxviii, p. 152, will be found a paper on "Paving Along Street Car Tracks," by the chief engineer of the Indianapolis Traction and Terminal Company, which answers and discusses in detail the above questions. The sub-grade is excavated by him to a depth of 10 inches below the bottom of the ties and rolled till compact. The excavation is

filled with Portland cement concrete to within 5 inches of the top of the rail. The rail is a 9-inch, 90-pound girder rail laid on 6 by 8-inch white oak ties spaced 2 feet, so that the concrete covers the ties and encloses the bottom 4 inches of the rail. With a 5-inch T-rail, it would come to the top of the ties. A special beveled edge stretcher brick is used outside the rails with a wooden strip under the head of the rail to keep the rail from direct contact with the brick, reduce the effect of vibration and prevent the crushing of the brick by wide-tread wheels.

An article by the same author in vol. xxv, p. 342, describes a similar construction with a 7-inch Shanghai T-rail, using a special shaped nose brick next the rail to form a groove for the wheel flanges, which has proved quite satisfactory after some seven years' use. This same construction is compared with others in an article on "Paving Between Street Railway Tracks and Rails," by ex-city engineer B. J. T. Jeup of Indianapolis, in vol. xxxii, p. 327.

The principal requirements in street railway track construction, especially if the track is to be used by heavy interurban cars, are stability and durability. The deep rail, 7 to 9-inch, gives a stiffness which is lacking in the ordinary A. S. C. E. sections, and which is more necessary in a paved street than in a steam railway. The concrete foundation under the ties gives the solidity to the bed which is absolutely necessary for stability in the track.

The wooden ties are an element of weakness and of trouble, as they are imbedded in the concrete and the foundation must be renewed when decay makes it necessary to renew them. In vol. xxxii, p. 38, and briefly in vol. xxxiv, p. 40, is described a track construction which removes these difficulties and would be directly applicable to the present case and perhaps justify the 5-inch T-rail. It consists of longitudinal beams of concrete, reinforced by longitudinal rods if desired and tied together with rods if deemed necessary. In the tops of these beams are alternate large and small recesses. The large recesses receive rectangular blocks of creosoted wood, set on a layer of sand as a cushion and means of setting rails accurately to grade. The small recesses give opportunity for bolts or rods to fasten the rails to the concrete. The article has photographs showing the track under construction and completed. It is now in excellent condition after three or four years' wear.

If the company keeps the pavement between its rails in repair it will find the most stable construction the most economical. If the city must make the repairs it should insist on the most stable construction possible.

Street Grading Machinery—Cost of Quarrying and Crushing Rock.

This town will shortly be in the market for an elevating grader suitable for street grading where it is necessary to load the dirt on wagons. I should like to be put in communication with the producers of such machines and with any parties who would be likely to have a second-hand machine for sale. I would also very much appreciate the kindness if you can tell me if any one is building a combination traction engine road roller with gas power. I should also like to be advised where I can get up-to-date information on the cost of quarrying and crushing rock for concrete and road building.

T. S. D., ———, Iowa.

Names of makers of the machinery desired will be found in the "Business Directory," printed in each number of MUNICIPAL ENGINEERING, under the headings "Contractors' Tools and Machinery," "Crushers," "Engines for Grading," "Engines for Plowing," "Excavating Machinery," "Gas Engines," "Gasoline Engines," "Road Locomotives," "Road Machinery," "Road Plows," "Road Rollers," "Rock Crushers," "Scrapers," "Scraper Blades," "Street Contractors' Supplies," "Street Scrapers," "Traction Engines," "Wheel Scrapers."

The latest edition of Gillette's "Handbook of Cost Data," ($5) contains some figures on cost of quarrying and crushing rock.

There is a rather detailed article on "Quarrying and Crushing Stone," in MUNICIPAL ENGINEERING, vol. xxviii, p. 360; also some information on cost in vol. x, p. 202.

Filler for Brick Pavement.

I am interested in a brick pavement filler that will be of the very best for durability, least noise, and to be waterproof and admit of repairs with as little expense as possible.

What do you recommend, asphalt or Barrett's paving pitch?

W. E. S., Warrensburg, Mo.

The various fillers have their particular points of value and one should be selected for the particular work required of it. It can hardly be said that any one meets all the stated requirements with absolute perfection, and a valuable opinion cannot be given without full knowledge of the special conditions. Full information about them all can be found in the volumes of MUNICIPAL ENGINEERING. Much valuable information in great detail is obtainable from the manufacturers and advocates of the various materials and methods. Their names and addresses will be found in the "Business Directory" printed in each number of MUNICIPAL ENGINEERING, under the headings "Filler," "Filler Asphalt," "Paving Brick Association," "Paving Filler," "Paving Pitch," "Pitch," "Pitch Filler," "Asphalt Filler," "Mineral Rubber."

The following articles in MUNICIPAL ENGINEERING gives details about these various fillers:

In vol. xxxviii: "Specifications for Expansion Joints for Brick Pavements," p. 110; "Specifications for Laying Brick Pavements," p. 320, giving those adopted by the organization of municipal officials for standardizing paving specifications, using cement filler; "Brick Paved Highways," p. 396.

In vol. xxxvi: "Can Brick Street be Refilled with Waterproof Filler?" p. 243.

In vol. xxxv: "Coal Tar Pitch Filler," p. 39; "Brick Street Paving in Columbus, O.," giving experience with tar filler, p. 141; "The Proper Construction of Brick Street Pavements," giving experience with cement filler," p. 279.

In vol. xxxiv: "How to Apply Asphalt Fillers to Brick Pavement, p. 185.

In vol. xxxv: "Cement Filler for Brick Pavements," giving specifications and methods, p. 85; "Brick Pavements in Paris, Ill.," giving experience with cement filler, p. 160; "Sarco Filler for Block Pavements," giving the points of advantage in this asphalt filler, p. 282; "Pioneer Filler Asphalt," giving sources of information about this asphalt filler, p. 362; "Material for Filling Joints of Brick Pavements," p. 390, giving the experience of the engineer of streets of Newark, N. J., with tar and asphaltic filler and his resulting specification.

There are other articles in earlier volumes.

Sufficiency of Brick Specification.

The following is a copy of the specifications for a paving brick: "The brick must be hard burned street paving brick, smooth and free from checks or fire cracks. When broken the fracture must be smooth and straight and the texture shall be uniform throughout and not granular. The brick shall be not more than 4¼x4x9 inches nor less than 2½x4x8 inches in size and only one size of brick shall be used i any single contract. The best quality of what are known as number 2 brick may be used. They shall be sufficiently vitrified as not to disintegrate by the action of frost or the inclemency of the weather. Neither must they be overburned so as to be exceedingly porous or extraordinarily brittle. Each bidder must submit with his bid not less than six (6) brick as a sample of the brick he will use in the work, which shall be subjected to such physical tests as may, in the opinion of the engineer be necessary to determine their quality and durability for the work and the brick must be equal in all respects to the samples furnished. Samples as above specified may be submitted by manufacturers, in which case bidders proposing to use brick of such manufacturer will not be required to submit samples. The engineer and superintendent will use care and diligence in sorting and culling the brick and the contractor is required to assist and co-operate with them in doing so."

I would like to know what grade of brick you would consider was required under these specifications.

How would you ascertain the quality of the brick furnished for the work?

G., Logan, O.

The specification reads as though it were prepared to suit a special condition, the first sentences being descriptive of the appearance of the bricks which will be acceptable. Some of these items seem to the outsider rather difficult to comply with strictly. Apparently the specifications call for the best quality of No. 2 brick, whatever that may mean for the locality in which it is used, and the contractor or manufacturer practically defines No. 2 brick by means of the samples which he files under the requirements of the specification.

This definition should be and probably would be considered subject to the approval of the city engineer, through his acceptance or rejection of the samples filed as equal or not equal to "the best quality of what are known as No. 2 brick," especially since No. 2 brick may be classed according to whether they are over- or underburned in comparison with No. 1, and the two classes of No. 2 brick have quite different qualities.

When accepted by the city engineer these samples become the standards "and shall be subjected to such physical tests as may, in the opinion of the engineer, be necessary to determine their quality and durability for the work." According to the strict wording of the specification these tests are not the basis of the acceptance or rejection of the samples, although they may aid the city engineer in making his decision as to whether they are equal to "the best quality of what are known as No. 2 brick." The tests are rather to determine the quality of the accepted sample, so that there may be a basis for comparison of the sample with the brick furnished for the street, for the brick furnished "must be equal in all respects to the samples furnished"; a provision which requires that they be subjected to the same tests as the samples if a thorough comparison is to be made. The specification is lacking in descriptions of injuries to bricks which will cause rejection, possibly because this is also left to comparison with the samples filed. But if the sample bricks are subjected to the rattler test they will no longer be in condition to use for comparison as to external injuries.

It is evident that the softer No. 2 bricks will have quite different characteristics from those rejected from No. 1 on account of harder burning, so that the city engineer must either choose which class he will accept, if bricks of both classes are included in the samples, or must subject the two classes of bricks to separate tests. Since the tests are comparative among the filed samples of brick and the test samples taken from the delivered brick, comparisons with tests of other bricks are not called for. The rattler test may therefore be applied to the samples, classified if necessary as above stated so as to get the most readily comparable results, but, generally speaking, and using samples taken at random with-

out classification, the rattler test results on such culls as are ordinarily denominated No. 2 brick would not be sufficiently uniform to give any reasonable basis for comparison.

It is to be definitely understood that the specification does not require a first-class brick, and that it depends upon the judgment of the city engineer as to whether the "best quality of what are known as No. 2 brick" are selected. It may very well be the case that the said best quality of No. 2 will fill all the demands of the traffic on the street for which they are intended, in which case the use of the poorer brick, if it results in a large saving in cost, may be fully justified.

Municipal Stone Quarries and Crushers.

Can you furnish me the names of any U. S. cities owning and operating a municipal stone quarry which furnishes crushed stone for the city's road construction and repairs?

T. J. W., Milwaukee, Wis.

Among the municipal stone quarries are those at Auburn, N. Y., Newton, Mass., Baraboo, Wis., Boston, Mass., Kankakee, Ill., Geneva, N. Y. Some of these own the quarries and some own their stone crushing and screening plants which they move from one quarry to another or in which they crush stone purchased from private quarries and hauled to the plant. Will our readers inform us of other plants of either kind?

Cost of Brick Paving with Granite Curb.

Will you kindly send me what data you may have relative to vitrified brick paving with granite curb. What I need especially is the cost here in Florida, but in case you have none, the cost at the nearest point will do.

W. T. T., St. Petersburg, Fla.

The only figures at hand are from Savannah and Valdosta, Ga., and St. Augustine, Fla., where brick pavements recently laid with no foundation other than sand cost from $1.63 to $1.70; in Columbus, Ga., where brick pavement on concrete foundation and with cement filler cost $1.73; and in Atlanta and Macon, Ga., where it cost with pitch filler from $1.85 to $2.08 per square yard. It is probable that a Florida pavement with granite curb would cost about the same as the Atlanta or Macon pavements quoted, if on concrete foundation.

In Professor Baker's book on "Roads and Pavements," ($5) will be found a collection of cost of details, including rolling subgrade and laying concrete, 47.2 cents; sand cushion 5.5 cents; brick laid, 68.3 cents; filling joints and top dressing with sand, 2 cents, making a total of $1.27. To this should be added for cement filling and expansion joints 11.5 cents; granite curb, according to width of street, say 15 to 25 cents; administration and profits, say 30 to 40 cents; and grading, according to the requirements of the particular case; putting the total cost somewhere between the limits named. Variations in cost of labor and materials will increase or decrease the cost, the resultant probably being an increase for Florida over Professor Baker's figures.

Municipal Abattoir.

The writer has been appointed chairman of a committee to work in conjunction with the Board of Health of our city for the purpose of improving the quality of meat and milk consumed by our people. Will you kindly give me the names of some of the cities who have solved this problem, or the address of some one to whom I might write to be advised on this subject. An early reply will be very much appreciated.

S. J. R., Ft. Smith, Ark.

Can our readers give any help toward answering this question? The writer knows of no municipal abattoirs in this country. Toronto, Ont., is said to have a successful municipal abattoir, and Montreal, Que., is also supplied with one. They are quite common in European cities.

One in South Africa is described with illustrations, in MUNICIPAL ENGINEERING, vol. xxxv, p. 224.

Nashville, Tenn., has one authorized, "Nashville abattoir," operated by private parties, and the ordinance fixes prices that can be charged for slaughtering animals and cold storage of meats.

Seattle, Wash., has a similar ordinance regarding authorized slaughter houses.

There is more or less municipal control of the operation of abattoirs in Boston, Mass., New Orleans, La., Terre Haute, Ind., and others, but nothing approaching municipal ownership or operation so far as the writer knows.

Remedy for Slippery Pavement.

We are having some trouble with a wood block pavement on account of the slippery condition. Under certain atmospheric conditions, it is exceedingly slippery and horses find difficulty in holding their footing. The blocks are of creosoted South Georgia pine and laid to a true surface. Can you suggest a remedy for the trouble?

J. W. BARNETT, City Engineer,
Athens, Ga.

Foreign cities in which wooden block paving has been popular for many years report the same difficulty. It exists in rather exaggerated form in London on account of the frequent humidity of the atmosphere. The only satisfactory remedy seems to be sanding the roadway at the time of slipperiness and sweeping up the sand a few hours later when the humidity of the air has diminished enough to permit the street surface to dry out. This occurs so frequently in London that regular provision for the sanding and sweeping is made, so that the work can be done before the traffic begins in the morning and the sand can be removed before it is crushed and dried and blown about as dust. Coarse sand or fine gravel (called

shingle) is used for the purpose and a light sprinkling of the sand is all that is necessary.

The effect of slipperiness can be diminished by reducing the crown of the street. This can be safely done if the pavement is well laid with a smooth, even surface and joints completely filled, only enough fall to the gutters being kept to insure that water will not stand on the clean pavement, and the pavement being cleaned at least as frequently as once a day. If there is a pronounced grade in the street, this reduction in the crown is still more desirable.

Paving Over New Sewer Trenches.

Is it considered bad practice to sewer and brick a street both in the same season? W. E. B., Mt. Gilead, O.

This is not the best practice but it is frequently done. In some soils the practice is dangerous, but usually, if great care is taken in compacting the material in the trench thoroughly and a good concrete foundation is put under the brick, the practice is reasonably safe. No general rule can be made for compacting all materials. Each one requires its own methods, tamping in some, flushing in others, dryness or moisture according to the demands of the particular material.

A badly filled trench in clay may give more trouble from settling after several years than a well filled trench paved over the first year. A skillful engineer on the roller which compacts the subgrade under the concrete for the brick pavement can locate most of the weak spots in the sewer trench.

Books on Macadam Country Roads.

Please refer me the best work on road construction with special reference to macadam county roads to cost from $1.50 to $3.00. SUBSCRIBER.

The writer does not know any book that just fits these requirements.

Aitken's "Road Making and Maintenance" ($6) gives full detail of English practice and is an excellent book on macadam road building from quarrying rock down. It devotes a few short chapters to pavements, but very little space to the modern tar, oil and asphalt macadams.

Baker's "Roads and Pavements" ($5) devotes about one-fourth its space to macadam road building, with similar limitations as to modern forms. It has good chapters on gravel roads and about half is filled with discussion of street pavements. The book is excellent, excepting the chapters on earth roads, which are harmful rather than valuable.

Byrne's "Treatise on Highway Construction" ($5) is probably the best American book on the subject. Pavements take a comparatively small part of the 800 pages in the book.

Gillette's "Economics of Road Construction" ($1) is a nervously written sort of book that requires considerable knowledge of the subject to make proper selection of the valuable matter in it.

Judson's "Road Preservation and Dust Prevention" ($1.50) is devoted entirely to the modern forms of treated road surfaces.

Morrison's "Elements of Highway Engineering" ($2.50) is a college text book, half of which is given up to pavements. It has the limitations on the practical side due to its college authorship and purpose.

Greenwell's "Roads" (5 shillings) is a fairly good book on English practice.

Spalding's "Roads and Pavements" ($2) is another text book, much more practical than the one above mentioned, but quite brief and devoting less than half of its 340 pages to macadam and similar road surfaces.

Who Supplies Cobblestones?

I have had several gentlemen here ask me the price, etc., of cobble stones for pavement. If you can give me some information along this line I will appreciate the same. I would like to have the address of some firm or firms handling cobbles and price per yard in car load lots.
N. W. G., Helena, Ark.

There is so little demand for cobblestones that, so far as the writer knows, there is no one making a business of supplying them. Some firm supplying gravel may be able to get together a supply of cobblestones if a special arrangement is made. The cost would depend very largely upon the expense of saving the stones and shipping them. Perhaps some one can be found, not too far away, who would like to get rid of the stones culled from his gravel deposit or rejected by his gravel or sand screen, in which case the cost of the cobbles should not be great.

Can our readers supply any information about a possible source of a supply of cobblestones not too far from Helena, as measured by freight rate?

Information About Grade Crossings.

Will you kindly inform me whether you have any material in regard to grade crossings in cities which we could either borrow or purchase. I am looking up this subject for the civic department of the Woman's Club of this city and shall be glad of any information or material which you can give me.
M. W. F., Louisville, Ky.

There has been considerable material on this subject in technical periodicals during the past twenty-five years which is indexed in the periodical indexes doubtless on file in the public library. Probably the best discussions of the subject will be found in the reports of the Elevated Track Department of the Chicago Bureau of Public Works, particularly those made before the track elevation began and during the early years of the work. Possibly these reports are yet obtainable of the

Chicago Department of Public Works and possibly they are on file in one or more of the Louisville city offices.

In MUNICIPAL ENGINEERING will be found a brief illustrated article on the Philadelphia subway and elevated tracks in vol. xxxv, p. 217, and another on the general plans in vol. xxxiv, p. 92. A history of the efforts toward track elevation in Indianapolis in vol. xxxiii, p. 30, vol. xviii, p. 335, vol. xvii, p. 164. Chicago and suburbs track elevaton is considered n vol. xxv, p. 48, xxiv, p. 286, xxi, p. 347, xvi, p. 397. Some Detroit grade crossings are described in vol. xxvi, p. 192.

There is an editorial on the "Abolition of Grade Crossings" in vol. xxiv, p. 24; an illustrated article on "The Abolition of Railroad Crossings at Grade" in vol. xxi, p. 60.

A report on grade crossings in New York City was submitted to the Public Service Commission of that city early this year, by Edward M. Bassett, which discusses the problem for that city and the defects of the New York state law. It has as appendices a history of the grade crossing case in Minneapolis and a brief statement on the elimination of grade crossings in the cities of Chicago, Buffalo, Cleveland, Detroit, Ft. Wayne, Indianapolis, Kansas City, Milwaukee, and Philadelphia, the states of Connecticut, Massachusetts, Vermont and Wisconsin, and in Canada and Great Britain.

The American Railway Engineering and Maintenance of Way Association, 962 Monadnock Building, Chicago, Ill., has published in Bulletin 99 a bibliography on the subject of track elevation and depression in cites, whch can be obtaned for 50 cents from the secretary at the above address. The roadway committee presented a valuable report on the subject in vol. 9 of the proceedings of the association, 1908, giving a tabulated statement of the work done in the cities engaged on it. These proceedings can be procured at $2.50 in paper, $3 in cloth or $3.50 in half morocco.

Depth to Lay Water Pipe.

In conveying water through a 2-inch pipe a distance of two miles on a graded slope of 18 inches per rod to empty into an open storage tank, where the weather in winter falls to 20 below zero, how deep would you advise to cover the pipe? How many air cocks would be necessary How does wood pipe compare with iron for water works systems?

G. C. M., Richfield, Utah.

The duration of the low temperature has more effect upon the depth for laying pipe than the actual minimum. If the given minimum is unusual and lasts only a few hours, the pipe can be laid in a shallower trench than if the temperature remains quite steadily at a higher average low temperature. Thus the general rule for depth of pipe in the eastern states is 4 to 5 feet for latitude 42 and 6 to 7 feet for latitude 45, whereas for the Northern Mississippi and Missouri valleys it is 5 feet and 7 feet respectively. Altitude above the sea has something to do with this required increase in depth. Small pipes require greater depth than large ones. Taking into account the latitude of Richfield, its altitude, the probable brief duration of the minimum temperature and the small diameter of the pipe, two of which tend to reduce and two to increase the depth, it is probable that a depth of 4 to 5 feet will be ample, and if the average winter temperature, day and night, is not far from 32 degrees, 4 feet will be sufficient. But if the average winter temperature keeps up an active freezing process after several weeks, then the depth should be 5 feet.

If the pipe is laid on a uniform slope of 18 inches per rod, about 9 feet per hundred, there will be no need of air cocks. If, as is probably the case, the pipe has occasional summits and depressions, there should be an air cock, and, preferably, a small air chamber at the top of every summit. The air must be let out of these points occasionally. The length of time between visits will depend on the size of the air chamber, and the amount of air in the water. Some of the chambers on a long line will collect more air than others, according to the profile of the line.

For a pipe of this size not under too great pressure, the comparative cost of iron and wood at the locality would probably settle the question of which to use, unless there were questions of soil constituents acting upon wood or iron, or variations in moisture in the soil, or difference in loss of head by friction in so long a pipe. If the fall of 9 feet per 100 extends for the whole two miles there is a difference of elevation of nearly 1,000 feet, so that this loss by friction would materially affect the rate of discharge of water. If the flow of water is cut off at the lower end, the pipe will be subjected to the total pressure due to the difference in elevation in its length and it must be strong enough to stand the 400 pounds or more per square inch which this amounts to. Will the 30 to 60 gallons a minute which a 2-inch iron pipe in poor to good condition would discharge under these conditions be sufficient supply?

Best Form of Water Works Franchise.

Will you kindly advise where I can get the best information for the requirements of a water works franchise.

A. J. MCKENZIE, City Engineer,
Webb City, Mo.

The principles stated in the editorial in MUNICIPAL ENGINEERING, vol. xxxviii, p. 335, are excellent. They are put into the form of a franchise in a paper on "A Co-operative Water Works Franchise," presented at the last meeting of the American Water Works Association by J. W. Alvord. A copy can probably be obtained from the secretary of the associa-

tion, J. M. Diven, superintendent of water works, Charleston, S. C. A similar franchise will be found in MUNICIPAL ENGINEERING, vol. xxxvi, p. 247, as prepared by D. H. Maury for another city. On p. 177 is a sketch of the provisions which are essential in a water works franchise or contract. Articles discussing principles upon which franchises should be based will be found in vol. xxxv, p. 36, and vol. xxiii, p. 166.

Methods of Testing Creosote Oil.

Will you kindly inform me whom I should address to obtain copy of Bulletin No. 65 of American Railway Engineering and Maintenance of Way Association.

E. WHITMORE, City Engineer,
Port Huron, Mich.

This bulletin can be obtained by sending fifty cents to the secretary of the American Engineering and Maintenance of Way Association, E. H. Fritch, 962 Monadnock Building, Chicago, Ill.

Who Made This Valve?

In the water system here there are a number of valves for shut off purposes. A few days ago one of them started to leak and after having it dug up for repairs I found the packing box and gland both broken, but held in place by the stud bolts. I have tried to find the maker of the valve in several catalogues but it don't seem to be listed in any of them. It s a gate valve and the size is 4-inch. The marking on the side of the valve, all in capital letters is Scott 25, 86 or 88, I could not be sure whether it is 86 or 88, but the rest of the lettering is quite plain. On the other side of the valve is the figure 4. What I would like to know is, where I can get the parts to repair the broken ones, so if you know who the makers of it are I would be glad to get into communication with them.

J. J. H., Goldfield, Cal.

Can any of our readers supply the information?

Engineer's Charge for Special Assessment Work.

I should like to ask if you can inform me as to the usual charge made by engineers for the necessary work to be done in connection with special assessment covering water service pipes, sewers and paving?

Is it customary for the engineer to bid a certain percentage of the total cost of the work; and if so, what do you consider a fair percentage?

R. H. R., Chicago, Ill.

The question is not clear. If the charge for entire engineering services is meant, reference may be made to the May number of MUNICIPAL ENGINEERING, vol. xxxviii, p. 346, for a statement of reasonable fees and considerations which might modify the fees named.

It is quite customary for engineers to name a percentage of the cost as the basis of their compensation. Occasionally, where the proceedings may be long drawn out, a modification providing for salary or payment of inspectors or assistant engineers for extra time on account of delays should be included in the agreement.

If the question refers to the process of making the special assessments for the improvements named, this is largely clerical work and is usually paid for by the day or month, a salary of say $10 to $20 a day being allowed the engineer and up to $5 a day for the clerks.

Provisions of Charter for Small City.

We are about to frame a charter for the purpose of incorporating as a city under the general act of the Michigan Legislature, enabling villages of 2,000 so to do, and I would like to get a copy of the proceedings of the seventh annual convention of the American Society for Municipal Improvements, containing a paper on city government, price $1.00. Can you supply it? Have you anything else along this line?

A. P. WEBER, Village President,
Fremont, Mich.

The volume referred to can be supplied. It contains an extensive review by F. W. Cappelen of the provisions in the charters of a number of large cities all over the world existing prior to its date, 1900. Some advance has been made in the last ten years and, also, a small city does not require so elaborate a system of government as a large city, so that there are at the present time sources of information more closely applicable to the conditions in the small city mentioned.

In the first place, a large number of executive officers is not required, but one or two competent, expert men, who can be retained during good behavior are imperatively demanded.

The commission form of government, one application of which is described in an article on "Memphis Under a City Commission," in MUNICIPAL ENGINEERING, vol. xxxviii, p. 27, has many advantages for the small city, not the least of which is the election of one member of the commission each year, so that there is no opportunity for a complete change of administration at any one time. Nominations by petition instead of by parties is another most important improvement generally introduced with the commission form of government, but just as valuable in any other form. The various methods of making nominations for office are compared and contrasted in an editorial on p. 105 of the same volume.

An article on p. 345 compares the commission form of government and the so-called federal form, with the recent modifications in Indianapolis and particularly in Boston, which incorporate the best features of the commission form and omit some of its objectionable features. It coordinates and refers to a number of prior articles discussing various details.

Particular attention is called to the municipal business manager, whose success in one city is shown in vol. xxxvi, p. 279, as one of the experts which the small

city should employ. With a salaried business manager, clerk and perhaps mayor, the two former being employes and the later one of the commissioners, the small city will be well supplied with executive officers and the commissioners can be expected to serve for merely nominal compensation if they receive any whatever.

A former mayor of Indianapolis describes the present charter of that city in an article on p. 404, vol. xxxviii.

Charges for Engineering Services Computed on Total Cost.

Will you kindly tell me through the "Question Department" what the engineer's percentage on materials used in construction is, if any, in eastern practice?

P. O. Box 12, Edmonds, Wash.

See the answer to a similar question herewith, also the answer in vol. xxxvii, p. 346. The same percentage is charged on all the items of cost of the work. The usual division of charges is on the basis of preliminary studies and plans, detailed plans and specifications, superintendence of construction and inspection, as outlined in the articles above referred to and others referred to in them. Each of the percentages is computed on the total cost of the work, including materials, labor and other necessary expenses of the work. The cost may be the estimated cost or the actual cost according to the nature of the contract with the engineer and the necessities of the case, but no difference is made between materials and other items of cost, unless there is a special contract to that effect. Much of the work of the engineer and his inspectors during construction is connected with the selection, inspection and handling of the materials and, unless the circumstances are very exceptional, there is no apparent reason for a different percentage on their cost.

Number and Cost of Electric Lights.

I am anxious to get some specific information regarding community lighting.

How many arcs or how many incandescent lights are necessary for, say, a mile of streets, and at what cost can this light be secured under normal circumstances?

What is the average rate over the country?

H. I., New York City.

The volumes of MUNICIPAL ENGINEERING are sources of much information on these questions. But one of the early results of investigation will be the conviction that each town or city is in many respects a problem to itself and that a brief study of a given town by an expert accompanied by a citizen familiar with special needs will give a more economical plan for lighting the town than any general plan cut down or expanded to suit the mileage of streets.

In vol. xxxviii is an article on "Arc and Other Electric Lights," which answers some of the question above asked. This article will repay study and will be a guide to a close study of the problem of relative cost of various kinds of electric lights.

The average cost of electric light throughout the country is not far from the figures stated in the article for particular cases, viz: $80 a year per open arc lamp, $56 per enclosed arc lamp, $47 per magnetite lamp, doing somewhere near the same service, and $22 per 60-cp. tungsten lamp doing perhaps one-third the service. Incandescent carbon filament lamps are also used at prices which, when enough lamps are used to perform the same service, amounts on the whole to about the same total.

On pp. 107 and 186 of the same volume are lists of previous articles answering the questions in more or less detail.

The proper method of determining the cost of and the charges for electric lighting is set forth in the article on p. 108. Two good articles will be found on pp. 166 and 169, the former on "The Tungsten Lamp and Its Relations to Central Stations" and the later on "Central Stations for Towns of 1,000 Population." The latter article assumes 5 arc lights and 60 60-watt series incandescent lamps as the requirements for street lighting in a town of this population. On p. 187 is a long list of cities giving population, number of street lights, rates for the same and cost of plant.

The lighting plant of Thomasville, Ga., is inventoried on p. 249, and on the same page is "A Comparison of Cost and Efficiency of Methods of Street Lighting," which compares the results with open arc and luminous arc lamps, with carbon, gem and tungsten filament lamps.

On p. 330 is an article on "Rate for Tungsten Street Lamps" in one of the tables of which is shown a variation in rate for 40-c. p. lamps from $14.40 to $25 a year and in 60-c.p. lamps from $17.50 to $23.40 a year.

On p. 393 is an article on "Factors That Should be Considered in Making Street Lighting Contracts." Some figures of rates for one city and comparisons with other rates are given in articles on p. 417.

All of these articles are in one volume, six months, and show the practical value of MUNICIPAL ENGINEERING as a source of information for such studies as this.

The recently issued volume of "Statistics of Cities Having a Population of Over 30,000; 1907" compiled by the U. S. Census Bureau, gives data for the answers in a general way of the above questions, but they may be very misleading if proper allowance is not made for differences in local conditions. Thus the number of arc lights used per 100 miles of street varies from 14.1 in Sioux City, Iowa, to 1,382.8 in York, Pa. Of the cities reported 76 use more than 350 arc lights per 100 miles of street and 82 use

less than 350. Fifteen cities with population over 300,000 average 385.6 arc lights per 100 miles of street. Twenty-nine cities between 100,000 and 300,000 average 291.2; forty-seven between 50,000 and 100,000 average 327.3; and 67 between 30,000 and 50,000 average 252.6.

The reports concerning use of incandescent lights are very scattering and quite as variable. The number of lamps per 100 miles of street, varies from 0.8 in Dubuque, Iowa, to 1,876 in Malden, Mass. In cities of over 300,000 population the variation is from 1.8 to 411.6 and the average of the 6 cities reported is 50.6. In 10 cities of 100,000 to 300,000 population the variation is from 10.7 to 944.7 and the average is 144.5. In 29 cities of 50,000 to 100,000 population the variation is from 5.4 to 1,138.3 and the average 154.1. In 31 cities of 30,000 to 50,000 population the variation is from 0.8 to 1,876.0 and the average is 95.8. Thirty-four cities use more than 150 lamps per 100 miles of street and 43 cities use less. It is evident that in neither case, incandescent or arc lights, do these figures give any indication as to how many lights should be used per mile of street, and the returns probably do not give the information really wanted, although they may answer the question asked in the blank.

There are but few reports of prices paid per lamp included in the tables. In the cities of over 300,000 population the prices for open arc lamps in 3 cities reported vary from $63.83 in Baltimore to $100.06 in Philadelphia per lamp per year; for enclosed are lamps in 13 cities from $52.93 for part of the lights in Chicago municipal plants to $130 for a part of the New York city lights; for incandescent lamps in 5 cities from $9.15 in San Francisco to $31.28 in Boston per lamp per year, with a few lamps in Washington running from $41.25 to $65.

In cities of 100,000 to 300,000 population the prices paid for open arc lamps in 9 cities reported vary from $45 in Toledo, O., to $104.75 in Providence, R. I.; for enclosed arc lamps in 20 cities from $48.80 in Nashville, Tenn., to $86 in St. Paul, Minn.; for incandescent lamps in 9 cites from $4.22 in Los Angeles, Cal., to $28 in Denver, Col., and Atlanta, Ga.

In cities of 50,000 to 100,000 population the prices paid for open arc lamps in 14 cities reported vary from $60.22, with a few lamps at half price, in Schenectady, N. Y., to $100 in Hoboken, N. J.; for enclosed arc lamps in 34 cities from $47 in Harrisburg, Pa., to $105 in Somerville, Mass.; for incandescent lamps in 28 cities from about $5 average in Oakland, Cal., to $36 in Savannah, Ga.

In cities of 30,000 to 50,000 population the prices paid for open arc lamps in 15 cities reported vary from $55 in Bay City, Mich., to $120 in Woonsocket, R. I.; for enclosed arc lamps in 55 cities from $19.65 in Taunton, Mass., to about $114 in San Juan, Porto Rico, and $112 in Butte, Mont., and Pawtucket, R. I.; for incandescent lamps in 29 cities from $2.75 in Taunton, Mass., to $34 in Auburn, N. Y.

A few cities report lamps paid for at more than one price. Taking the prices in all the cities in the list, 23 of the prices for open arc lamps are $80 or more per lamp per year and 27 are less; 76 of the prices for enclosed arc lamps are $70 or more per lamp per year and 70 are less; 49 of the prices for incandescent lamps are $20 or more per lamp per year and 41 are less. These mid prices are not far from the averages for the country, being probably a little higher than the averages for the respective kinds of lamps.

Sewage Purification by Irrigation.

I am desirous of obtaining some information on the advisability of installing septic tanks in a town of 5,000 inhabitants, located in a fertile valley some distance from good sand and gravel, the necessary ingredients to a purification plant. From the information I have at hand septic tanks are an expensive proposition and not altogether a success. On the other hand ranch land can be purchased quite reasonably, and I think the necessary pipe (24-inch or 30-inch concrete) to carry the sewage a mile and a half to a favorable location for a sewer farm would not amount to any more, if as much, as a purification plant nearer to town. Good sand or gravel costs from $2.00 to $3.00 per yard, and crushed rock about $4.00 delivered. The pipe would cost about $3.00 per ft. laid. Under ordinary conditions am I not right? I should appreciate your opinion. I should presume a sewer farm to be the most economical form of sewage disposal.

H. H. M., ———, Nev.

Where irrigation is practical it would seem to be most economical, in the broad sense of that term, to use sewage for irrigation, both because it adds to the supply of water for this purpose and because there is a certain amount of matter in the sewage which serves as a fertilizer. There are some practical difficulties which have prevented entire satisfaction in all respects in such cities as Los Angeles and Pasadena. which have used this method of sewage disposal to some extent, but for a small city these difficulties can be overcome readily and the success should be more pronounced.

Even if the sewage effluent is not used for broad irrigation it should be possible, unless the soil is more than usually impervious, to use it for filtration purposes, with as many changes of filtration area as the circumstances of the case require.

Which method would be the best can only be determined by a careful study of the exact conditions on the ground.

Assuming, as is probably the case, that irrigation is the best system to adopt, it will be necessary to provide a settling and screening tank to remove all solid matters of size and kind such as would interfere with the passage of the water into the soil, and as would give rise to nui-

sance by clogging the surface and there decomposing. In a properly designed tank all of this matter except paper, sticks, rags, and the like, will be liquefied during the passage of the sewage through it, so that the solid matter to be disposed of at the screens can be handled without nuisance.

Unless a rotation of fields and crops can be established which will take the sewage effluent as it flows from the tank every day and all day, it will be necessary to set aside one plot where sewage disposal is considered more important than the crop, on which the sewage may be turned when there is no crop ready to receive it without damage.

The size of the tank, the number and area of the plots of ground to receive the sewage, etc., must be determined with reference to the amount of sewage at present to be disposed of and the probable growth of the town. The amount from a town of 5,000 people is small enough to be handled easily and without nuisance. Evidently it will require constant care, but not much more than the irrigation and cultivation of the land requiring the same amount of clean water.

The supposed high value of the sewage as fertilizer has heretofore suggested its use in irrigating garden crops, especially in climates where the gardens can be kept growing nearly all the year round, but some prejudice against this class of crops was aroused by some of the observations made of the method of handling them at Los Angeles and Pasadena, and the consequent fear of the distribution of contagion by means of the vegetables in case the sewage were infected with germs of disease. English walnuts have been commended as an excellent crop for sewage farming, in view of their growth on trees, the impervious shells, and the antiseptic result of the usual bleaching of the nuts before sending them to market. Alfalfa, and other forage crops, fruit and other trees, would also promise well as safe crops, and the writer believes that reasonably sanitary care of vegetable crops would render them perfectly safe.

Lists of articles on the septic tank to be found in the volumes of MUNICIPAL ENGINEERING, will be found in vol. xxxvii, p. 241; vol. xxxiii, p. 249, and vol. xxxi, p. 280. Since the latest of the above lists the following have appeared:

In vol. xxxvi: "Best Method of Purifying Sewage," p. 238; "Method of Sewage Disposal," p. 362.

In vol. xxxvii: "The Sludge Problem in Sewage Purification," pp. 19 and 40; "Status of Sewage Disposal in America," p. 80; "Cost of Disposal Plant," p. 106; "Agriculture on a Sewage Filter," p. 105; "Sewage Disposal Plants and Stream Pollution," p. 119; "The Cesspool and its Dangers," p. 240; "Disinfection of Sewage and Sewage Effluents," p. 365.

In vol. xxxviii: "Cost of Septic Tank," p. 40; "Information About Cameron Patents on Sewage Purification Processes," p. 192; "Sewage Purification for the City of Dresden, Germany," p. 248; "Information About Sewage Disposal," p. 346; "Effect of Sewage and Sewage Gases on Concrete," p. 390.

There is a brief article on the "Profits of the Pasadena Sewer Farm" in vol. xxiv, p. 54.

Covers for Septic Tanks.

What sort of material is the better for covers over septic tanks?

IRWIN H. ALTHOUSE, City Engineer,
Porterville, Cal.

This is largely a question of expediency. A wooden cover will answer every purpose so far as the tanks themselves are concerned. If the span of the roof is not too great, concrete beams and slabs will be satisfactory and not too expensive. Recent experiments on the effect of sewage on concrete reported in the June number of MUNICIPAL ENGINEERINNG and in this July number, show that the gases formed in a septic tank do not act injuriously upon concrete. There are, however, one or two reports of slight deterioration from sewage gases where there was no ventilation, so that it would be safest to insure thorough ventilation or to paint the concrete with a substance not acted upon by sulphuretted hydrogen. In a climate with great virations in temperature there should be provision for expansion and contraction in the concrete without danger of cracks. The concrete beams would doubtless be reinforced and the slabs may be also if desired.

Steel trusses may be used to support the roof if they are kept painted so that the gases from the sewage will not act on the metal.

If first cost has a large influence in making the decision, wood will probably carry the day. Concrete will be most permanent; and if wood is expensive and concrete materials are cheap, it may easily be more economical in the long run to use concrete.

From these considerations a choice can be made by one who is familiar with the local prices of materials and the local conditions.

Information About Garbage Destruction.

The city contemplates erecting a garbage incinerator. I desire as much information as possible on this subject, and shall appreciate it if you will refer me to such books, papers and literature on the subject as I may be able to procure. The city has a population of about 15,000 of which garbage will have to be taken care of.

G. H. L., ———, N. D.

Morse's "The Collection and Disposal of Municipal Waste" ($5) is the fullest single source of information available. It gives data about nearly or quite all the garbage disposal plants in the United States, and about many in other countries.

Venables' "Garbage Crematories in America" ($2) describes the cremation furnace for garbage and other city refuse and Parsons' "Disposal of Municipal Refuse" ($2) is devoted mainly to refuse disposal as distinguished from garbage destruction.

Branch's "Heat and Light from Municipal and Other Waste" ($3) is devoted to the utilization of the heat from refuse and garbage destruction, mainly by a single system.

There are two good English books, mainly describing high temperature garbage destruction. They are Goodrich's "Disposal of Town Refuse" ($3.50) and his "Refuse Disposal and Power Production" ($5), the latter describing the numerous English types of plant where the heat generated by the destruction of the garbage and refuse is utilized for the production of power.

Several plants for the incineration of garbage are described in MUNICIPAL ENGINEERING.

Particular attention is called to the series of papers on "Town Scavenging and Refuse Disposal, now appearing. These articles take up all parts of the subject from the collection of the garbage and refuse to the utilization of the heat and the clinker from the garbage furnace. They began in November, 1909, vol. xxxvii, p. 287, and are not yet completed.

A furnace for a small city, such as the one referred to in the question, is described in vol. xxxviii, p. 63. The problem of garbage collection is briefly discussed in vol. xxxviii, p. 194 and in vol. xxxvii, p. 36 will be found a list of previous articles on this subject. An abstract of a commission report on the collection and disposal of Boston refuse will be found in vol. xxxviii, p. 209. There is an article by Mr. Morse on "High Temperature Garbage and Refuse Destructors on p. 258, and a list of previous articles on p. 422 of the same volume.

Brief discussions of various details with lists of previous articles will be found in vol. xxxvii, p. 36 and vol. xxxv, p. 179. The following are not included in these lists: The New Orleans plans for garbage collection and disposal are given in vol. xxxvii, p. 49, with some practical hints on the handling of details. Odorless carts are described in detail in vol. xxxvii, p. 129. A full description of an English refuse destructor and power generating plant will be found in vol. xxxvi, p. 253.

The following good articles will be found in vol. xxxvi: "The Chicago Underground Railway System of Refuse Disposal," p. 21; "Refuse Destruction in Richmond Borough, New York City," p. 359, giving an illustrated description of the new high-temperature destruction plant for a district of 26,000 population; "Disposal of Municipal Refuse in the United States," p. 376, a review of a series of papers on the subject by a number of experts; a brief description of the use of "Garbage and Refuse as Fuel in Nottingham, Eng.," on p. 394.

Sewers on the Franchise Plan.

We have a client who is figuring on getting a franchise for a sewerage system in a town of about four thousand people. Will you let us know where we can get some data regarding rates, etc., for privately owned sewerage systems?

My recollection is, there are about a half dozen so owned in the United States, which no doubt you know of.

J. Z. G., Memphis, Tenn.

In MUNICIPAL ENGINEERING, vol. xi, p. 372, is a brief statement of the provisions of the city ordinance of Telluride, Col., fixing the rates and terms for use of a private system of sewers. The rates seem rather high, if the use of the system is general, being $1 a month for residence of 4 rooms or less, increasing to $1.50 for 8 rooms or more, $5 for hotels, $3 for laundries and saloons, 2 cents per scholar for schools, etc., all per month.

The Atlantic City, N. J., Sewerage Company, vol. xxii, p. 94, formerly charged 75 cents per room per year, with shops, stores and offices $4 a year each. This company is now disposing of the sewage of the city as a whole.

The Asbury Park, N. J., Sewer Works, see the same article, charged from $30 to $75 for making connections and $5.50 to $10 per year rental for store or regular sized dwelling, and $25 to $50 a year for hotels.

New Orleans formerly had a sewer company, see vol. xxii, pp. 253 and 397, but it is now entirely superseded by a municipal system. The terms of the franchise are discussed in vol. x, p. 417, and vol. xiii, p. 93.

Shelbyville, Ind., had five private sewer companies, each really in the nature of a partnership to build a sewer line for the benefit of the partners, but admitting others along the line on payment of agreed sums. These will shortly be connected with the city system, now under construction and will then become a part of it. Columbus, Neb., Newton, Kan., McKinney,, Tex., are cities having similar private sewers.

Long Branch, N. J., formerly had a private sewer system which is now operated by the municipality.

Natchez, Miss., Shreveport, La., Toronto, O., have granted franchises to sewer companies in the past. The tendency in all the cases named is toward assumption of the plants by the city. Thus Vincennes, Ind., has secured plans for sewer systems at various times, but has not yet constructed them, and a contractor under an agreement with the county put in a sewer to serve the courthouse and is charging residents and stores along the line rental for using the sewer. It is possible that at some time in the future

the council can agree to build a municipal system on the lines of some one of its numerous plans, in which case the private sewer company will probably cease operations.

The supreme court of Colorado stopped the operation of private sewer companies in that state by a decision that the city had no right to grant a franchise for such purpose. See abstract of decision in vol. xxiv, p. 201.

The city of New Albany, Ind., secured the passage of an act to authorize construction of sewers by a private company, but finally constructed a system at public cost. See vol. xxiv, p. 138.

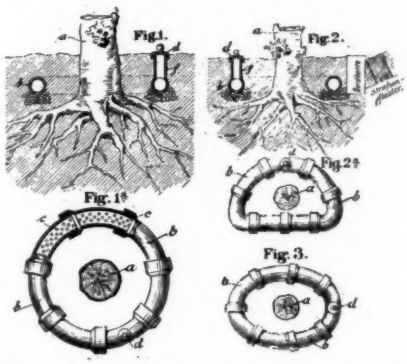
FROM WORKERS IN THE FIELD

Practical Points from Practical People.

Contributions to this Department are invited. Give from your experience for the benefit of others. No matter about the style of the composition, the fact is what is wanted. Use the Question Department for what you want to know; use this Department for what you can tell others.

Supplying Water to Trees in Street Lawns.

A communication in *Tonindustrie-Zeitung* describes and illustrates a method of supplying water and fertilizer to trees in such restricted spaces as the lawns of streets, paved areas, small yards and the like. As shown by the accompanying cut, reproduced from a German periodical, a pipe ring is laid entirely round the tree, the pipe used being of form to fit the locality the best. This pipe, which may be of any suitable material, is perforated on the bottom, and is laid in a bed of gravel or slag. From one of the lengths of pipe a T extends to the surface, where it may be capped. The water or liquid fertilizer is introduced into this T and so reaches all sides of the tree.



A single test on a large number of trees in one locality proved very successful, but the expense is probably too great to make the use of the device general. It should, however, be of much value in the special cases mentioned above.

If the gravel bed drains the water away from the pipe promptly there should be little or no trouble from roots growing into the pipe and filling it.

Effect of Sewage and Sewage Gases on Portland Cement Concrete.

The paper on the above subject, an abstract of which was printed in the June number of MUNICIPAL ENGINEERING, was quite fully discussed at the meeting of the Concrete Institute at which it was presented by its author, Mr. Sidney H. Chambers, and the following points of interest were brought out, as reported in *The Surveyor and Municipal and County Engineer.*

Mr. Edwin Ault referred to a case which appeared to corroborate that of the author. They had had occasion to report on the corrosion of certain concrete pipes used in a tropical city for the carriage of sewerage. The pipes were made with good cement and clean, sharp sand, and were 4 in. internal diameter, more than ¾ in. in thickness, and of high quality. Corrosion appeared only in the upper aerial parts, while the portions of the pipes covered by the sewage were found to be unaffected. Analysis of the incrustation showed the presence of sulphur, and, bearing in mind the rapidity of the decomposition of organic matters in the tropics and the great humidity of the ordinary atmosphere of this particular city, as well as that the sewage was a domestic one of great strength, he had not the slightest doubt that the corrosion was due to the same cause as that experienced by Mr. Chambers.

Mr. D. B. Butler mentioned a similar case of a piece of concrete pipe from the tropics, his conclusion being that the

coating on the pipe was largely sulphate of lime, and that the disintegraton was due to corrosion from the sulphuretted hydrogen from the sewage. From experiments that he made with cement briquettes he found that the part immersed in solution did not appear to be affected, while the part in the sulphuretted hydrogen gas was disintegrated in four or five days. It appeared to be entirely a matter of ventilation, and if a pipe were so ventilated as to avoid the gas disintegration would not occur.

Mr. A. C. James (Grays Thurrock) said he had to deal with a very strong sewage, and practically all the tanks and works through which the sewage passed were formed of concrete. Owing to the flat nature of the district the flow was slow, and the sewage when it reached the works was very concentrated and in a septic condition. The sewage flowed into two uncovered receiving chambers formed of Thames ballast and cement, 4 to 1 concrete, but after fifteen or sixteen years' use these were still absolutely sound. The septic tanks were of concrete, and there was no sign of disintegration in these. Bad foundation had resulted in considerable cracking of the tanks, and it had been necessary to cut into the walls for the purpose of repairs. The walls were therefore in a condition which would render attack easy, but there was still no sign of any action having taken place. His suggestion was that there must be something in the material of which the Hampton concrete was made that was really responsible for the trouble that had taken place.

Mr. W. Kirkcaldy said he did not entertain much doubt as to sulphur being the cause of the disintegration. They should endeavor to get the concrete as dense as possible. Perhaps, also, in special circumstances it might be possible to find some coating.

Mr. E. P. Wells stated that from his experience he found they got the greatest amount of sulphur in London in the neighborhood of cookshops. Wherever a large quantity of cabbage water was discharged they found it highly charged with sulphuretted hydrogen, so that, under those circumstances, if the sewage at Hampton were allowed to rest for some time a considerable generation of gas would result.

Mr. A. Roechling said he considered that no alarm need be felt by those who had been using concrete tubes in connection with the disposal of sewage, because the conclusions of the author limited the subject to one particular point—namely, that of very foul or putrid sewage. Whenever there was a chance of the formation of sulphurous acid—which he was inclined to think was the active agent in disintegration—they should avoid using concrete. There were certain conditions under which the use of concrete tubes was inadvisable, but these were exceptional and extreme conditions. For example, when they had very hot sewage discharging into a sewer they should not be employed, because the hot sewage set up an action which led to cracks and which, no doubt in many cases, resulted in the collapse of the tubes. Further, they should avoid using concrete which came in direct contact with acids. He had examined septic tanks and cesspits which had been in use for a number of years, and found the cement rendering practically intact, and he put it to Mr. Chambers whether this was due to the absence of free air. At Hampton they had artificial ventilation, and it might be owing to that that oxidisation of the sulphuretted hydrogen proceeded more rapidly and effectively. Concrete was a very suitable material for sewerage or sewage disposal purposes, but those who used it should bear in mind, under certain conditions, it might lead to disaster.

Mr. Arthur E. Collins, city engineer of Norwich, in a communication on the subject of the paper, stated that there were some concrete sewers in Norwich which were laid in 1891, and which varied in internal diameter from 42 in. to 22 in., their total length amounting to several miles. These sewers were first used for the carriage of sewage about twelve years ago, and showed no signs whatever of disintegration. The main outfall discharged into a pair of concrete tanks forming screening chambers, and the concrete in these had not deteriorated. The sewage passing through the screens was pumped into the sewage farm, where for nearly forty years it had been conveyed into an open concrete carrier, and no disintegration had taken place there. His attention was called a few years ago to a reservoir in East Anglia in which bricks from the Peterborough district were used, and in that case the mortar was disintegrated; this, he was informed, being due to the presence of sulphur in the bricks. He was consulted on one occasion with reference to the failure of some brickwork which was supposed to be laid in cement mortar, but which, about twelve months after construction, collapsed. An analytical chemist who was consulted reported the presence of a large amount of sulphur, and in that case also it appeared that the sulphur came from the bricks, which were likewise from the Peterborough district.

Mr. H. K. G. Bamber, F. I. C., in another communication, said he agreed with Mr. Chambers that the probable cause of the defects was the action of sulphur compound, although there might be some doubt as to the precise action which took place. His belief was that a fairly warm temperature and a moist atmosphere were necessary to produce the results which had been shown. The remedy seemed to be the formation of an absolutely impervious and smooth surface.

Useful Notices to Water Users.

To the Editor of MUNICIPAL ENGINEERING:

Sir—I am enclosing copies of two cards that this department is using, thinking that they might be instructive to some of the many people interested in the same line of business.

The postal notices we have used since June, 1906, and up to this date have sent out nearly 15,000 of them. Every card is numbered in the left hand upper corner and a record of this with the meter readings and account number is kept in a book provided for the purpose.

We find this notice has been very well received by the patrons and has saved the department a great deal of annoyance from complaints and saved them large water bills. We have over 15,000 meter accounts and during our annual collections in Nov., 1909, we made less than 25 reductions on acount of large consumption.

The red card (second below) is one just got out and they are being distributed by the meter readers this month. Our

patrons, as a whole, seem to be glad to get the information.

J. M. WISLER, Superintendent
Water Works Department,
Toledo, O.

BOARD OF PUBLIC SERVICE.
Toledo Water Works Dept.

Toledo, Ohio,.....191..

.....

Our meter reader reports an unusually large consumption of water at.....
You must have a waste of water or leak. Please investigate, and have repairs made, otherwise you will have a large water bill.

Yours truly,
J. M. WISLER, Supt.

To the Patrons of the
of the
TOLEDO WATER WORKS

It is quite important that all meter users know how to read a meter, in order to keep posted as to the amount of water they are using and to verify the meter reader's reading, and for this pupose you will find on the opposite side of this card a meter register with the information how to read it.

Residence meter bills are payable on or before May and November 10th. These bills can be paid, by mail, with bank draft or check, postal or express money order, which will save a great many of our patrons' time and inconvenience. The different express companies and the post-office have about 80 branches where these orders can be procured at a very small cost. Have them made payable to the Toledo Water Works and enclose them with your bill in an envelope with a two cent stamp on it, and we will return the bill properly receipted.

Quite a number of our patrons are using water motor washing machines and water motor soft water pumps.

A motor washing machine requires from six to ten cents worth of water to operate per hour. Soft water motors will use an excess amount of water unless kept in good repair.

You can detect a leak in your fixtures by carefully watching the one foot hand on your meter dial, when there is no water being used, and if the hand moves it indicates that you have a leaky fixture and it should be repaired at once.

TOLEDO WATER WORKS.
Both 'Phones, Main 141.

READING
WATER METER REGISTERS

(Here appears a cut of the register of the meter.)

Numbers over the circles indicate the amount of one revolution of the pointers. The one foot circle is used only for testing and detection of small flows of water, and is not considered in service reading.

The usual method of reading is as follows: Disregard the one foot circle. Commence with the ten foot circle and read each higher one consecutively, putting down the figures in the same order, always taking the lower of the two figures between which the pointer stands. When the pointer is so near a figure as to apparently indicate it exactly, refer to the the next lower circle, and if that pointer has passed the "0" the figure indicated is correct; otherwise take the next lower.

In the example shown the reading of the "10" circle is 4; of the "100" circle, 3; "1,000" is 9; the "10,000" circle indicates 6; and the last, or "100,000," is 8, thus making the correct reading 86,934 cubic feet.

The above register is in cubic feet and the readings should be multiplied by 7½ to show the number of gallons.

Vitrified Pipe Line Under Pressure.

To the Editor of MUNICIPAL ENGINEERING:

Sir—Referring to the article on "Water Tight Joints for Vitrified Pipe," p. 265 of the April number, we report the following:

A pipe line for carrying water, made of sewer pipe, was laid in connection with the waterworks of Hobart, Okla. This line is about three miles long and has in this distance a fall of twenty-four feet. It was laid to conduct water from springs to the municipal pumping plant, and passes under creek beds and over some small hills, following the natural slope of the ground, and at several points is subjected to static pressure of about fourteen pounds. It has two valve openings at its upper end, one 4-inch and one 8-inch. The flow of water is regulated at these upper openings by an employee who resides a short distance from the springs. At the lower end the pipe line discharges freely into an open reservoir, from which point it flows to the pump. The conduit has been in use for about four years, and is said to have given perfect satisfaction.

The line is composed of 12-inch vitrified pipe, double strength, furnished by the W. D. Dickey Clay Manufacturing Company of Kansas City, who used special care in selceting the pipe for this line. The pipe was furnished in lengths of 2½ feet and sockets 3 inches deep; sockets and spigots both being corrugated. It was provided in the specifications that at least four joints should be made with the pipe standing vertical in the trench, and that it should then be carefully lowered and the joints connecting these sections be made in the trench. The joints were made by taking a roll of U. S. Navy oakum and calking it into the joint, using proper calking tools to drive the gasket into place and care being taken that the space was entirely closed, to prevent the liquid from running into the pipe. The jointing material was composed of a mixture of one-third pure asphalt, one-third crude asphalt and one-third petroleum, with a little granulated lime added to stiffen the mixture, which was heated to about 200 deg. and then poured into the joints. The joints made in the trench were poured by the use of a clay roll similar to that used in lead joint construction.

Experiments on the jointing material were made during one winter, the pipes being subjected to a freezing temperature and then to a temperature of about 130 deg.; the joints being subjected to a water pressure of thirty-four pounds to the square inch during these experiments without showing any leakage.

The cost of the pipe line laid complete was 72 cents per lineal foot. The contract

was let in combination with the rest of the waterworks plant, and other bids for this particular item were received as low as 54 cents per lineal foot. The cost of the work shows a considerable saving over any other material known which would secure satisfactory results. The surveys, plans and specifications for this work were made by us and were submitted to the Interior Department of the United States for approval, which was given them and the construction was supervised by the engineers of the United States Geological Survey.

BURNS & MCDONNELL, Civil Engineers,
Kansas City, Mo.

MUNICIPAL MATTERS IN COURT

Higher Courts—Board of Health vs. Sewer System—City Pays Deficit—Cincinnati Wood Block Paving—Texas Drainage Law—Damage for Inadequate Service—Omaha Water Works Purchase—Asheville Paving Assessments—Kansas Dike Assessment—Drain for Street Improvement—Viaduct Maintenance by Railway—Macadamizing Is Repairing.

Decisions of the Higher Courts of Interest to Municipalities.

Special Assessments — Regularity of Proceedings.—To recover an assessment for public improvements, only a substantian compliance with the law is required.—City of Salem ex rel Roney et al v. Young (Mo.) 125 S. W. 857

Construction of Sidewalks — Notice of Owner.—Where a property owner attended a meeting of the board of aldermen at which an ordinance condemning a sidewalk adjacent to his property was passed and requiring the construction of a new sidewalk, and then notified the city that he would not pay for the construction of a new walk, he thereby waived the right to formal notice of the proceedings and cannot set up want of such notice as a defense to a suit on tax bills; the object of notice being merely to allow the owner to make any objections to the proceedings or to build the sidewalk himself.—Idem.

Extension of City Boundaries Over Unplatted Land.—Under Rev. St. 1879, sec. 4932, authorizing the mayor and board of aldermen of a fourth-class city, with the consent of the majority of the qualified voters, to extend the city limits over any adjacent territory, such a city could extend the city limits over unplatted adjacent territory.—Idem.

Water Supply by Water Company—Rights of Consumers.—The business of a company furnishing water to the public is naturally monopolistic, and, being given the power of eminent domain to serve the needs of the public more effectually, its business is affected with a public use, and it must serve all consumers with equal facilities and without discrimination.—State ex rel. Ferguson v. Birmingham Water Works Co. (Ala.) 51 S. 354.

Public Water Supply by Water Company—Discrimination in Rates.—If a rate to favored customers of a water company is less than the reasonable rate it may lawfully demand from all on a basis of uniformity, the discrimination is at the company's expense, and does not impinge on any right of consumers generally, and the granting of a rate to a considerable number of consumers more favorable than the rate fixed for consumers generally in absence of justification would be evidential that the general rate is so unreasonable as to call for municipal or legislative revision within constitutional limitations, but making a concession to a consumer does not fix a new schedule of rates for all according therewith.—Idem.

Water Company — Discrimination in Charges — Indictment — Revocation of Franchise.—If within the limit of rates fixed by an ordinance-contract and by its right to a reasonable compensation a water company capriciously and oppressively, for ulterior and unlawful purposes, discriminates so as to wrong and injure consumers, it would plainly abuse its franchise, and the inquiry in such a case would be as to whether it might not be punished by indictment or process to revoke or annul its franchise.—Idem.

Municipal Corporations — Unauthorized Expenditures—Partial Invalidity.—Where the primary object of a public expenditure is to subserve a public municipal purpose, the expenditure is legal, though it also incidentally involves an expense

which, standing alone, is unlawful, but where the primary object is not to subserve a public municipal purpose, but to promote a private end, the expenditure is illegal, though it may incidentally serve a public purpose.—Brooks v. Incorporated Town of Brooklyn et al. (Iowa) 124 N. W. 868.

Municipal Corporations—Powers—Erection of Buildings.—An incorporated city situated in a farming community with a population of 1,200, has no power to erect a city building designed for an opera house with an auditorium, box office, ticket window, stage, balcony, dressing rooms, etc., though of the floor space of about 6,000 square feet, 1,200 square feet is to be used by the city government for offices, fire department, etc.—Idem.

Public Improvements — Assessments — Effect of Condemnation Proceedings.—The constitution, forbidding the taking of private property for public use without compensation, necessitates the ascertaining of the compensation and the levy and collection of an assessment to pay the cost of property taken by a city for the improvement of a street, before any work on the improvement of the street is performed, and Laws 1905, c. 55, authorizing cities to condemn land for public use, is designed solely to ascertain and assess the compensation; and hence a city acquiring land for widening and regrading a street may order the improvement of the street and levy an assessment to pay the cost thereof under its charter provisions, and need not levy the assessment in the condemnation proceedings—Brown et al v. City of Seattle (Wash.) 106 Pac. 1113.

Water Works Company—Effect of Expiration of Franchise.—On the expiration of a water company's franchise by limitation, the company's right to operate its plant and use the streets of the city therefor ceased, and with it the right of the city to demand service.

Where, after the expiration of a water company's franchise, it continued to operate its plant and render service to the public, it was bound during such period to perform the obligations growing out of such assumed quasi public service, to the extent that it was required to supply water adequate to its reasonable capacity and at reasonable rates, and to that extent it was subject to the jurisdiction of the courts to enforce its implied undertaking. Where the water company, after the termination of its franchise, continued to furnish water, it did so according to a quasi contractual relation, which was a mere license from which either it or the city could withdraw at will.—Laighton v. City of Carthage (Mo.) 175 Fed. 145.

Termination of Franchise—Removal of Water Company's Plant—Interference by City.—Where, after considerable litigation between a water company, whose franchise had expired, and the city, the water company, which was doing business at a loss, deeded its property to a mortgagee to save foreclosure expenses, and it appeared that the city intended to carry out its purpose to keep the waterworks plant in operation until such time as it could complete its own independent plant, though complainant was desirous of removing his property, he was entitled to an injunction restraining the city's officers from interfering, by suit or otherwise, with his employes in removing his pipes and appliances from the city's streets.—Idem.

Negligence—Construction of Structures—Liability to Subcontractors.—Where defendant, a subcontractor for concrete piers of a bridge, so negligently constructed the same, with knowledge that plaintiff, an independent subcontractor for the iron work, would necessarily place heavy valuable material and tools thereon, that one of them disintegrated and fell, causing damage to plaintiff's material and tools, and the defects in the piers were not known to plaintiff and could not have been ascertained by careful inspection, and defendant knew of the unsafe condition, defendant was liable for the injuries sustained, though there was no contractual relation between plaintiff and defendant.—Pennsylvania Steel Co. v. Elmore & Hamilton Contracting Co. (N. Y.) 175 Fed. 176.

Street Improvements—Use of Patented Material.—Where the mayor and council of a city of the first class pass a resolution stating the material to be used in certain street improvements shall be "Hassam pavement," a patented material or process, and the notice to contractors published pursuant to said resolution contains a statement that the owner of all patents and process covering the laying of such Hassam pavement will furnish to any bidder to whom the contract may be awarded the right to lay said pavement, and furnish to such bidder an expert to give proper advice as to the laying thereof, at a stipulated price, and a written offer by said owner to this effect is on file in the office of the city clerk during all the time said notice is being published and up to the time a contract for doing said work is let, such contract involving in its execution the use of such patented material or process is not invalid in the absence of actual fraud or deception.—Reed v. Rockliff-Gibson Construction Co. et al. (Okla.) 107 Pac. 168.

Streets — Extent of Easement — Rights of Abutting Owners.—Where a person owns land across which a street has been constructed, he owns the fee simple of the highway, subject only to the public easement, which extends, not only to the use of the surface for purposes of passage, but also to the portion which lies beneath the surface wherever it is needed for water, sewer, or gas pipes, or any other legitimate street use.

In the absence of an ordinance or

statute prohibiting it, an owner of the fee of the bed of a street had the right, without a permit from any one, to lay pipes across and under the street, so long as such pipes did not unduly interfere with public travel or with the subsurface use to which the street as such was subject.—City of Bayonne et al. v. Borough of North Arlington (N. J.) 75 Atl. 558.

Streets — Establishment of Grade.—Where a street grade was established and an abutting owner improved her property without reference to the grade before the street was actually lowered to the grade established, she was not entitled to damages to her property by the subsequent lowering of the street to the established grade.—Collins v. City of Iowa Falls (Ia.) 125 N. W. 226.

Public Improvements — Power to Take Bond from Contractor.—Municipal corporations of this state are authorized by statute to take from contractors for public improvements bonds to secure those who furnish labor or materials towards the completion of the contract.

A bond so executed and properly conditioned, but in which the penalty is less than the amount required by the statute, is valid, and one who is unpaid for work or material furnished by him pursuant to the contract may maintain an action upon the bond.—Waterous Engine Works Co. v. Village of Clinton (Minn.) 125 N. W. 270.

Power of Municipality to Erect Building in Street.—A city possessed of the powers of controlling the streets, and also of establishing, controlling and regulating market places, cannot, in exercise of the latter power, authorize by ordinance the erection of a brick building to be used as a market place in the center of a dedicated street, since, where land had been dedicated to public use as a street, it cannot be diverted from that use.—Peters et al. Market Comrs. v. City of St. Louis (Mo.) 125 S. W. 1134.

Kansas State Board of Health Seeks to Enjoin Use of Sewerage System.

Suit was filed in the district court, June 4, to enjoin Garnett, Kan., from further allowing the present sewerage system to be used and to abate the system as a nuisance. The complaint was made by Professor Hoad, of the state board of health.

City Must Pay Deficit When Sewer Assessments Are Reduced.

Indianapolis, Ind., will have to pay from its general fund $20,000 to the American Construction Company, as a part of the cost of building the East Michigan Street sewer, according to a ruling by Judge Charles Remster, of the circuit court. The sewer was completed in 1909, at a contract price of $152,000. The city assessment bureau assessed benefits for the amount which affected a large extent of real estate in the eastern part of the city, much of which was unplatted farm land.

Appeals were made to the superior court for a reappraisement, and appraisers appointed by the courts reduced the benefit in the amount of $20,000. As the courts approved this amount of reduction, the property owners did not have to pay the $20,000, and the construction company brought suit in the circuit court against the city of Indianapolis for that amount. The city demurred on the ground that it could not be liable under the law for the payment of more than $5,000 under such circumstances. Judge Remster held that since the reduction by the court appraisers could not have been anticipated by the contractor and the city, the city was liable for that amount.

Injunction Refused in Cincinnati Wood Block Paving Case.

The application of the United States Wood Preserving Company for an injunction against the officials of the city of Cincinnati, to prevent them from permitting A. J. Henkel & Brother to carry out a contract awarded them for the repaving of Reading Road, was denied, June 4, by Judge Howard Hollister.

The plaintiff contended that, although its bid was over $12,000 lower than the Henkel bid, it was not awarded the contract owing to a scheme to give the contract to A. J. Henkel & Bro.; that in accordance with the proposals advertised for the plaintiff submitted samples of the oils and prepared wood block it intended to use, but after they were presented to the city chemist these were turned down and the samples submitted by Henkel were accepted on the ground that the samples of the plaintiff did not contain the largest possible amount of anthracene or anthracene oil. The plaintiff claimed that the plans and specifications did not call for any such conditions as were imposed after the bids were opened, and that in other respects the samples were as good as any of the others.

The defendants admitted that the samples came up to the specifications, but that it was concluded by the officials that the presence of anthracene made the Henkel Bros. bid enough better to warrant the city officials give the bid to them even if it cost more.

Judge Hollister decided that under the circumstances he could not grant the application, but that he might have done so had the matter been brought by a taxpayer.

Texas Drainage Law Constitutional.

In refusing a temporary injunction recently in the case of J. C. Parker et al. against Harris County Drainage District No. 2, Judge Charles E. Ashe of the Eleventh district court, at Houston, Texas, passed upon the constitutionality of the

drainage law, holding that it is free from defect.

When the case was originally filed, a temporary restraining order was granted by Judge Ashe, stopping the drainage work until a hearing could be had to determine whether the injunction sought by the plaintiffs should be granted. The hearing was had on documentary evidence and affidavits, and after hearing arguments and examining the law, Judge Ashe decided that the temporary injunction should not issue. The plaintiffs will carry the case to the court of civil appeals.

The plaintiffs complained, in their petition, that the drainage distrct was invalid, because, of the thirty-one parties signing the petition as freehold citizens of the territory, more than one-third thereof were not and never have been such resident citizens; that there was no legal notice of the filing of the petition, because of the four notices required two were posted at Erin, and two at Almeda, and none at other points in the district, contending that two notices posted at two different public places in the same town or village was not a compliance with the law, to post at four different public places in the district: that upon the hearing of the initial petition the boundaries defined therein were adopted and that the civil engineer who was ordered to locate the necessary drains and ditches extended the east boundary line of the district without authority from the court to do so, and that the court set down the report for hearing, without indicating there had been any change in the boundary lines of the district differing from those mentioned in the petition and without requiring in its order that a copy of the report should be published, to give parties affected information that their property was to be included in the territory of the district, and that the notice on the report of the engineer did not contain contents of the same, and that it was posted at two different places in the territory, instead of four, as in the case of the notices on the petition; that the notices of the election to establish the district and auhorize the issuance of bonds were only posted at two public places, instead of four public places; that the commissioners court declared the district established by metes and bounds as contained in the engineer's report, thereby enlarging the district as originally petitioned for and adopted by the court, without notice to property owners in the new territory to be affected thereby.

The plaintiffs asked for relief as follows: Enjoining a further levy of tax in the district; enjoining delivering of bonds or any part thereof to parties claiming or asserting any right thereto; that the drainage district and its commissioners be enjoined from entering upon or allowing other parties to enter upon any land in the district, to do or undertake to do any work thereon, or incur any expense or debt on or concerning the construction of drains, canals and ditches.

Judge Ashe held:

1. That the statute under which the drainage district was organized is free from constitutional defect and valid, and that under said statute there was a bona fide effort made to organize the district in question, and that the commissioners court by decree entered of record ordered it to be established with its present boundaries, finding in its several orders that the district was established upon the petition of the required number of freeholders of the district, and that due notices had been given at each step as required by law; that drainage commissioners were duly appointed and qualified and the district organized about one year ago; that the district on May 1, 1909, issued bonds in the sum of $200,000, which were approved by the attorney general of Texas July 21, 1909; that $165,000 of said bonds were sold to Kinnaer Bros. to be delivered from time to time, and that $35,000 of said bonds have been delivered and that the district has received the money therefor; that the district on or about the 23d of June, 1909, entered into a contract with Kinnaer Bros. for $150,-531 to operate and construct canals, ditches, etc., and that said Kinnaer Bros. at the time of the institution of the suit had for some time been engaged in the construction thereof, and had actually caused to be constructed under their contract a number of miles of canals and ditches, and had also done a considerable amount of cleaning, widening and deepening of the natural streams of the district at a cost of $22,000; that the district, through its officers, since the date of its organization in February, 1909, has been actively engaged in carrying out the purposes of its organization; these facts I understand to be uncontroverted from the evidence before me, and I conclude therefrom that as a matter of law the drainage district, as organized, constitutes, if not a de jure, at least a de facto public corporation whose legal existence can only be questioned in a direct attack by quo warranto.

The commissioners court having found, by its judgment, adopting the petition, that the requisite number of freehold citizens of the district had signed the same, I conclude as a matter of law that its judgment in this respect is final and can not be attacked in a collateral proceeding such as the present one, even admitting that the requisite number of resident freeholder within the district did not sign same.

I conclude that the notices on the petition were duly posted according to law, but admitting that they were not so posted, that the order of the commissioners court finding that proper notice had been given of the filing of the petition would conclude plaintiffs in this collateral proceeding.

The uncontroverted evidence in the case showing that the property of the plaintiffs, J. C. Parker, W. H. Parker and Morgan Davidson to be located west of the Gulf, Colorado and Santa Fe railroad, and therefore necessarily in the district as originally petitioned for, they have no cause of complaint under their pleadings in this case.

I find that the original petition for the district by reasonable intendment would include the land of the plaintiff, S. E. Allen, and that the notices given upon said petition were sufficient to put the said Allen upon notice that his property might

be affected by the organization of the district, and the said Allen having failed to appear before the commissioners court to protest against the formation of the district, can not now be heard to complain that he did not have his day in court, or that his property is being taken without due process of the law of the land.

Gainesville, Tex., Must Sue Water Company for Damages, Not Forfeiture of Franchise.

The supreme court of Texas reversed the judgments of the district court and court of civil appeals recently, and remanded the case of the Gainesville Water Company, a plaintiff in error, appealed from Cook County, second district. The City of Gainesville had sought to have forfeited the franchise of the water company for alleged inadequate service.

In reversing the judgments, the court says:

We realize that this is an important matter to the city. Fire protection is of great importance to its people from different standpoints. No less important is wholesome water for domestic purposes, and if it were made to appear in this case that the water company has wilfully and persistently refused to perform its contract with the city in those particulars, or that it was rendered unable by reason of its financial embarrassment to do so, then it would be the duty of the court to declare a forfeiture of the franchise. The evidence in this case would sustain a judgment for damages for violation of the contract if damages were sought and proved, but it is insufficient, as a matter of law, to authorize a court to forfeit the franchise of the water company.

Omaha Must Purchase the Water Works.

The United States supreme court rendered a decision, May 31, at Washington, under which the city of Omaha, Nebraska, will have to take over the Omaha water company's plant at an appraised value of $6,263,25. The opinion was written by Associate Justice Lurton, who said that the court of last resort found no error in the decree of the circuit court of appeals, and the case would therefore be remanded to the circuit court to be proceeded with accordingly.

After reviewing the bill in which the Omaha Water Company seeks specific performance by the city of Omaha of the contract for the purchase and sale of the sytem of works owned by the appellee company and reciting the manner in which the amount of money was to be paid by the city was determined, Justice Lurton said:

Three major objections have been urged against appraisement. First, that it is not concurred in by all the appraisers; second, that the appraisers heard certain evidence without notice or giving the city an opportunity to hear or rebut; and third, that the property valued includes a distributing system beyond the corporate limits of Omaha by which cetain suburban villages are supplied.

The matter in question was in no proper sense an arbitration. The contract was in all of its terms agreed upon. One party was to sell and the other to buy at the valuation determined by the board of appraisers, and "unanimously" was not stipulated, for unanimity was hardly to be expected in a board made up as this was. When a matter of purely private concern is submitted to a determination of other arbitrators the rule seems to be that there must be unanimity in conclusion by such board unless otherwise indicated by terms of submission.

The justice then cited certain cases bearing out this contention. He continued:

The rule is, however, otherwise when the submission is one which concerns the public. In such submissions, whether it be an arbitration of differences or an ascertainment of value, the majority may act unless otherwise indicated by agreement for submission.

The justice frankly admitted that he could not see just exactly why this distinction exists, but said:

The reason probably lies in the fact that public affairs are controlled by majorities, and by analogy a majority should control when submission is a matter which concerns the public. But whatever the reason, so are the authorities.

The court said it was satisfied with the conclusion of the circuit court of appeals that the acquisition of the system as it existed at the time the city made its election to purchase was within the contemplation of both the city and water company and that the valuation of the system as an entirety was a matter in which the appraisers were required to act. The most weighty fact in this connection is that the system was one single system, having a common source of supply and common main connection therewith. He said:

Its dismemberment is not to be thought of unless it is clear that the ordinance exercising the option is so plainly limited to the purchase of only so much of the distributing system as lay whlly within the corporate limits as to admit of no other meaning. A presumption against dismemberment is not overthrown even if the city had no power to sell the water to people or municipalities beyond its limits. If these outside distributing pipes could not be lawfully used by the city for the purpose for which the water company had used them, it does not follow that the contract to buy would be thereby any less a contract to buy the plant as a unitary system.

Justice Lurton further said the value in equity and justice must include whatever is contributed by fact of the connection of items making a complete and operating plant. The difference between a dead plant and a live one is real value and is independent of any franchise to go on or any more good will as between such plant and its customers.

In conclusion Justice Lurton said the circuit court of appeals had considered and decided all the large questions involved under the bill, but did not direct the precise form of the decree which the circuit court should enter and remanded the case with direction to reverse the decree, dismissing the bill and to proceed in ac-

cordance with the opinion. He then recited the opinion of the court below in which it was suggested that "If there should be found substantial defects in the property the opportunity should be given the company to remedy them, and, if it is unable to do so, parts of the property so circumstanced can be valued and the purchase price abated accordingly."

Collection of Asheville, N. C., Paving Assessments Enjoined.

Judge Justice, after hearing arguments from both sides, June 7, in the case of Schank & Johnson vs. the City of Asheville, N. C., and C. H. Bartlett, tax collector, continued the order restraining the city from collecting the paving assessments from residents of Southside avenue. The injunction will remain in force until the trial of the case at a regular term of the superior court. The city will make an appeal, in the meantime, to the supreme court to have the order set aside.

The Southside paving case grew out of charges made by citizens of Southside avenue that certain irregularities existed in the collection of the paving assessments for work done on the street in 1906. Many residents have paid all, and all have paid a portion of the assessments made against them by the city.

A Kansas County Can Assess Property for Dike.

A decision was handed down by Judge Dana, of the district court, April 30, at Topeka, Kan., holding that county commissioners of Shawnee county were right in their attempts to assess the property adjacent to the proposed dike on the south side of the Kaw river. The state attempted to enjoin the commissioners from making this assessment. Judge Dana says the action of the county commissioners would be regular and justifiable by law.

New Jersey County Can Build Drain for Street Improvement.

A decision was rendered May 5 in the proceedings instituted by the mayor of Paterson, N. J., to enjoin the Passaic county board of freeholders from carrying out their plans for the improvement of Main street in Paterson and Harrison street in Passaic. It was decided necessary to construct a drain in the road to carry off the surface water which might accumulate in a certain section of the road. The counsel for Paterson conceded that the drain was needed, but denied that it was within the power of the freeholders to order it built. Counsel also contended that Paterson, being the largest factor in the contribution of taxes by the county, was likely to pay a greater proportion of the cost of construction and therefore has a greater right to complain than any other section.

Judge Minturn, of the Supreme Court, declared that the advent of the automobile has given an impetus to road building upon a concerted and systematic plan throughout the country, and that it has resulted in a departure from the heretofore settled policy of this state as regards road building, and dismissed the proceedings.

Under the present policy of road improvement, he said it must be assumed that the freeholders had power to authorize such incidental improvements as might be needed to put the road in permanent good order.

Regarding the contention about the proportion of taxes, he said:

In the aggregate the contribution of taxes from Paterson is greater than that from the city of Passaic, but as a corporate entity its contribution presumably as an arm of the state government is little or nothing. What its individual taxpayers may contribute is another question, but they are not complaining, and upon a proceeding of this nature it is not clear how Paterson as a corporate entity can intervene to represent them.

Wisconsin Railroads Must Keep Up Viaduct Roadways.

The Wisconsin Supreme Court handed down a decision early in May, holding that the laws of the state give the city full power to compel railroads to keep in condition the roadways on viaducts where city streets cross railroad tracks. As construed by the court, the law not only requires the roads to do the paving, but gives the city the means of compelling them by doing the work itself, and then collecting the cost of it through the courts.

Macadamizing a Gravel Street Is Repaving.

In a decision handed down by Judge Albert Kunkle, at Springfield, Ohio, recently, he held that the macadamizing of a street that has been graded and graveled before, constitutes a repaving, and only one-half the cost can be assessed against the property owners.

Prizes for Making the City Beautiful.

The Board of Trade of Knoxville, Tenn., has offered a cash prize of $50 to the ward in that city that makes the greatest improvement in appearance between June 1 and September 1. The tender of the prize was made by David C. Chapman, president of the Board of Trade, to Mrs. L. D. Tyson, president of the City Beautiful League. The prize is to be awarded and paid on City Beautiful day, during the Appalachian exposition.

Concrete Fence Posts.

Farmers' Bulletin No. 403 of the U. S. Department of Agriculture is on the construction of concrete fence posts and was prepared by the Office of Public Roads. It gives full details of the process and principles with many drawings of pieces of apparatus and structures.

LIGHT AND WATER

Indianapolis Ornamental Lighting—Combination of Lighting Companies—Bay City Lighting Plant—Gas Companies of Washington—Pipe Durability—New Jersey Water Supplies—Galveston Immigrant Station—Ohio Valley Water Supplies.

Water and Light for Galveston's Immigrant Station.

An item has been incorporated in the sundry civil appropriation bill by Representative Burleson, of Texas, providing for the construction of an 8-inch cast-iron water main from Galveston across the channel of the harbor of Galveston to such place on Pelican Spit, Galveston harbor, as may be necessary to furnish ample water facility to the immigrant station thereon, $15,158; for the construction and complete installation of electric light, power and telephone cables between Galveston and the immigrant station on Pelican Spit, $5,000. In all $20,158 is appropriated.

Lighting of Business Streets in Indianapolis.

For many years the city of Indianapolis, very progressive in many ways, had the reputation of being very poorly lighted, and there was much justice in the complaint. A recent mayor attempted to improve this condition, first by an arrangement with the electric light company having the contract for lighting the streets. He was not able to bring the city council and the company to an agreement upon the cost of the additional light desired, the council not seeing its way to make an appropriation sufficient to meet the lowest price obtainable from the company.

Then came an offer from an advertising firm to install a large number of extra lights upon the principal retail business streets without cost to the city, provided it was allowed to place some rather inconspicuous advertisements upon illuminated glass plates contained in the fixture. One of these posts was put up on a prominent corner, and met with so much criticism that the offer was not accepted.

It happens that the Merchants Heat and Light Company was organized a few years ago by a number of prominent merchants to furnish steam heat and electric light for their own stores. There was so much demand for their service, before it was installed, that the plant was made large enough to supply a considerable part of the business district. This company was so successful that last year it installed a new plant in addition to the old one, the new one being the largest heat, light and power plant in the city.

In casting about for business for the new plant, the mayor's plan for extra lights on the business streets was taken up, and on the expiration of his term of office he was put in charge of the development of new business for the company. It being impossible to do the extra lighting at public expense, the proposition was made to the merchants that they install the lights at their own expense. The beginning under this plan was made largely through the aid of the merchants owning the lighting plant, who placed them in front of their own stores. This soon demonstrated the beauty and the value of the added light and resulted in many inquiries for the lights, and it was easy to extend the contracts for light, especially since the company supplies everything and charges for the light a definite sum per year per linear foot of the frontage of the property illuminated. The following blank form of contract shows all the details of the service furnished:

CONTRACT FOR ORNAMENTAL STREET LIGHTING.

AGREEMENT, Entered into this....day of.....19...., between the MERCHANTS' HEAT & LIGHT COMPANY, hereinafter called the Company, and.....hereinafter called the Consumer, both of Indianapolis, Marion County, State of Indiana.

The Company agrees to install and operate a system of ornamental street lighting to consist of ornamental Pressed Steel poles, each equipped with five one-hundred-watt tungsten lamps, poles to be placed at equal intervals of eighty-four feet on both sides of the street. The Company further agrees to maintain said poles during the life of this contract.

The Consumer agrees to pay for such service $1.05 per foot front or a total of ..... (....) per year as .....proportionate share, based on a frontage of.....feet. Payment to be made to the Company on or before five days from date of bill rendered. The bills shall be rendered in twelve equal monthly installments.

The hours of service of said ornamental street lighting shall be from dusk to 12:00 p.m. during the life of this contract.

In event the Company shall not secure sufficient similar contracts to cover the square in which the Consumer's property is located to warrant the establishment of the system of lights herein provided for within six months from the date hereof, the Company may at its option cancel this agreement.

This contract shall be for a term of

five years, beginning ....., 19...., and ending ....., 19....

This contract, although signed by an agent of the Company, is subject to the approval of the general manager, and shall not be binding on the Company until indorsed with his approval.

It is finally agreed that all the terms and stipulations heretofore made or agreed to by the parties in relation to said street lighting service are merged in this contract, and that no previous or contemporaneous representations or agreements made by the Company's officers or agents, shall be binding upon the Company, except as and to the extent herein contained.

.....

MERCHANTS' HEAT & LIGHT COMPANY.

By .....

Agent.

.....

Consumer.

By .....

Approved....., 19..

.....

General Manager,

MERCHANTS' HEAT & LIGHT COMPANY.

These contracts are made by the tenants on the street floors of the buildings.

The standards used are made of pressed steel, two plain tapered truncated cones of 22 gauge high-carbon non-oxidizing steel being forced together, one inside the other, and then fluted like Doric or Corinthian columns. This column is fitted with a decorative base and a top carrying four suspended 100-watt tungsten lamps on four arms and one lamp on top of the post, all inclosed in diffusing globes. The top globe is 16 inches in diameter, the lower globes are 12 inches. The lamps burn from dusk to midnight every night. As shown in the contract the standards are set 84 feet apart along the curb line and the charge for the entire service, under a 5-year contract is $1.05 per year per front foot. The standards are wired from a 3-wire lead-covered cable run through a 4-inch tile set one foot from the curb and one foot under the surface of the gutter.

The Indianapolis Light, Heat and Power Company, operating a plant covering the entire city and having the street lighting contract had obtained permission to install a number of arc lights on tall overhanging standards of good design around the monument circle, on which the company's office is located, and put these standards in place about the same time. When the success of the younger company in extending its lighting system was observed, the older company took a hand also, and soon both companies were claiming the rights for the same block of street and were actually constructing two systems on the same block. This conflict was soon settled by the Board of Public Works and now permits are issued for each block of street to the company showing contracts for a majority of the frontage. The Indianapolis company now uses a cast-iron five-light tungsten lamp standard of similar appearance to those used by the Merchants' company, but somewhat lighter and more graceful. The passer-by scarcely notices the difference.

Because of the handsome appearance of the lights and the thorough distribution of the illumination over the street, the extension of the systems over the retail districts has been rapid, and over two miles of street are now lighted, practically all of them on both sides of the street. Washington street alone has nearly a solid mile of the lights in operation, and Illinois, Meridian and Pennsylvania streets are extending the lights each way from Washington street, with occasional blocks on other streets. Massachusetts avenue is another broad street having a half mile or so of lights on both sides of the street.

The only complaint that has been heard is from a member of the Art Association and the Civic Improvement Commisson, who thinks the display of glassware is too lavish, but the pleasant diffusion of the light, and the absence of glare and shadows certainly offset at night the comparatively slight effect of overweighted street during the day.

Consolidation of Lighting Companies.

The American Gas and Electric Company, of New York city, which owns the electric light plant in Hartford City, Ind., has purchased the Dunkirk Lighting Company. The company has been granted a franchise for a lighting plant at Redkey, and owns the electric light plants at Marion and Muncie.

Bay City's Lighting Plant Will Purchase Current.

Bay City, Mich., will, within 12 months, abandon the manufacture of electric current in its two municipal plants, and will take current from the Tittabawassee Power Company. Council voted, June 13, to make a contract with the company, to furnish this city with current at 8 mills per kilowatt hour. The city plants are now making electricity at slightly over 2 cents per kilowatt, and by an expenditure of $60,000 for modern machinery and combining plants should reduce the cost to 1½ cent per kilowatt. The city will guarantee to take a minimum of 50 kilowatts per hour and may run up to 1,600, and the Tittabawassee company will guarantee the delivery of current, July 1, 1911. The city will not abandon the commercial field established by the municipal plants, but will extend its system and furnish current at about one-third the present prices to private concerns.

Bill to Control Gas Companies in the District of Columbia.

A comprehensive bill was favorably reported by the House committee on the District of Columbia, June 14, to fix the price of gas in the District at 85 cents

a thousand cubic feet; to prohibit the local gas light companies from watering their stock; to provide for meters that may be plainly read by customers, and making other changes in the local law with respect to the manufacture and sale of gas. The bill is a substitute proposed by Representative Condrey, of Missouri, for the various pending bills affecting the production and sale of gas in the District. The measure provides that after the passage of the bill the Washington Gas Light Company and the Georgetown Gas Light Company may continue to charge 90 cents a thousand cubic feet until August 31, 1910, when the 85-cent rate shall go into effect. This section also specifies that hereafter "the standard rate of dividend to be paid by said companies to their stockholders, not to be increased otherwise than as hereinafter provided, shall be 6 per cent per annum upon the par value of their capital stock, which capital stock may be increased as herein authorized by said companies to amounts equal to the actual net value of the physical property of said companies, including working capital, as shown by the present book value of the same, less their outstanding funded liabilities respectively."

A limitation upon this authorization provides "that the total amount of capital stock hereby authorized shall not exceed in either case a sum equal to an amount found by capitalizing the amount of taxes paid by said companies for 1909 upon the taxation basis established by the acts of June 1902."

In any event, it is further provided, the total amount of the capital stock of the Washington Gas Light Company shall not exceed $6,500,000, and the total capitalization of the Georgetown Gas Light Company shall not exceed $300,000, without the express consent of Congress.

The Washington Gas Light Company, according to the bill, "may refund its outstanding liabilities to an amount not exceeding $3,200,000 into 5 per cent bonds, payable when the board of directors may determine, and that hereafter it shall be unlawful for the companies, or either of them, ever to issue any additional bond certificates of indebtedness or any other evidences of debt except such as shall actually be required for the payment of necessary betterment, extension or improvement without the express consent of Congress."

All evidences of indebtedness issued in violation of this inhibition are declared to be void by section 2 of the bill, and the gas company offending is made liable to a penalty of $1,000.

Section 3 provides that "during any year after the passage of this act wherein the maximum net price per thousand cubic feet charged by the said companies has been less than the standard price, the companies may pay dividends exceeding the standard rate, in the ratio of one-fifth of one per cent for every one cent of reduction of said maximum net price below the standard price.

Section 4 of the measure direct the gas companies to publish every September, in one or more local newspapers, a report for the previous fiscal year, showing among other things, "the cost per thousand cubic feet to such companies of gas in the holder, itemizing said cost so as to show the cost per thousand feet for gas manufactured, of wages at works and of the main items of materials; also the cost per thousand feet for distribution; also the amount per thousand feet, if any, charged for maintenance and repairs."

In case the clear profits of the companies applicable to the payment of dividends amount in any years to a larger sum than is sufficient to pay the dividends which the companies are authorized to pay by this bill, "the excess above the sum necessary for that purpose," the bill provides, "may from time to time, to the extent of 1 per cent per annum of the par value of the stock of the companies, be invested in government securities, and the interest arising from such securities shall be also invested in the same securities in order that the same accumulate at compound interest until the fund so formed amounts to a sum equal to one-twentieth of the par value of capital stock of the companies, which fund shall form a reserve fund; provided, that when and so often as the said fund shall, by reason of the accumulation of interest or dividend or otherwise, exceed one-twentieth of the par value of the capital stock the excess shall be carried to the credit of the clear profits of said companies applicable to the payment of dividends."

By the terms of the bill the companies are permitted to use this fund or any portion of it to meet any extraordinary claims, demand, or charge that may arise at any time from fire, accident, or other unavoidable circumstance.

It is also provided that the companies may use this fund toward the payment of dividends in case its profits are not sufficient to do this.

In case either of the companies shall make more in one year than it is authorized to pay in dividends plus the amount directed to be set aside in the reserve, and this excess is sufficient to increase the annual rate of dividends by 1 per cent, then the bill directs such company to reduce the price of gas the following year 5 cents per thousand cubic feet.

Section 7 has to do with meters, and directs that "no meter shall be used which may confuse or deceive the consumer in ascertaining the price he pays per thousand cubic feet or the number of cubic feet consumed."

Section 10 prohibits the gas light companies from refusing to supply gas for

any building or premises to any person applying therefor because a bill for gas remains unpaid by a previous occupant of the building.

Section 12 provides that inspectors or readers of meters shall be appointed by the justices of the supreme court of the District, and must subscribe to an oath to make and take true readings only.

Durability of Cast Iron Pipe.

While making repairs to the water works system of Eugene, Ore., recently, a section of pipe laid twenty-four years ago and in constant use ever since, was taken up in apparently as good condition as when first laid. The pipe, which had been covered with a preparation of tar, would have still served its purpose for years, but for the fact that it is too small.

Proposed Water Supply for Several New Jersey Cities.

At a conference held June 12 by representatives of Montclair, Paterson and Passaic, N. J., and Morris R. Sherrerd, of the State Water Supply Commission, the interests of those municipalities in the acquisition of a water supply were discussed. The proposition of the Water Supply Commission provides for the construction of a system of reservoirs, under authority of the State, the cost to be levied on the municipalities benefited. It is proposed to meet the cost of maintenance by a pro rata assessment of the municipalities using the water thus provided, on the basis of their respective consumption. It is the purpose of the Water Supply Commission to construct these reservoirs in the Wanaque valley, the acquirement of which for a water shed has been Paterson's ambition. Paterson has suggested an alternative proposition, of joining with Passaic, Montclair and other municipalities in acquiring water rights, but the respective merits of the two schemes are still to be determined.

Surface Water Supply of Ohio River Basin.

The Geological Survey is publishing in its Water-Supply Papers numbered 241 to 252 a series of reports showing the flow of streams in the United States as determined by measurements made in 1907 and 1908. Papers 241, 242, 244 and 252, covering respectively the streams of the north Atlantic coast, the streams of the south Atlantic and eastern Gulf coasts, the streams of the St. Lawrence basin, and the streams of the north Pacific coast, have already been published. Water-Supply Paper 243, relating to the streams of the Ohio river basin, is now ready for distribution.

The information collected in these reports is essential to navigation, irrigation, water power, domestic water supply, drainage, and flood prevention.

A special feature of Water-Supply Paper 243 is a table giving a summary of mean monthly discharge in second-feet per square mile for streams in the Ohio river basin for 1907 and 1908. This table affords a means of making comparisons of relative rates of run-off for different areas in the basin. These comparisons show, in a general way, the seasonal distribution of run-off and the effect of snow, ground, surface, and artificial storage. The almost entire lack of uniformity or agreement between any two stations indicates that the discharge of each stream is a law unto itself and that the safe and economical development of any project that is dependent on stream flow must be based on long records collected with great care as near the location of the project under consideration as possible.

Public Comfort Station for Indianapolis.

Indianapolis is about to open its first public comfort station, which has been well located in close proximity to the busiest corner in the city, at least so far as visitors from outside the city are concerned. At the intersection of Washington street, 120 feet wide, and Illinois street, 80 feet wide, a diagonal street, Kentucky avenue, 90 feet wide, runs off to the southwest, in a direction which business has thus far shunned, perhaps because no car line has run on this street until recently, and none now runs over the first block of the street.

The public comfort station is located in the center of Kentucky avenue, where it touches the area formed by the intersections of the three streets named, and is mainly below the surface, the roof extending about 3½ feet above the level of the street. Above this roof is an ornamental ventilating shaft, finished as oxidized copper, with the inscription, "Public Comfort Station," quite similar in appearance to other stations of the same sort. It has rounded ends, with entrance and exit by separate stairways. The entrance for men is nearest the corner and that for women at the opposite, southwestern end. The station is about 75 feet long by nearly 25 feet wide, with a wide asphalt driveway on each side. The interior is divided into the two sections for men and women, with urinals, closets and washbasins, in what has become the standard design for such structures, and will certainly prove to be a great convenience, particularly to strangers in the city.

The only question which the observer asks is why it is placed so far below the surface, since it completely occupies the surface area and would be even more accessible if it were not down so many steps.

The example is a good one for Indianapolis itself to follow, as well as other cities.

STREETS AND SEWERS

Repaving vs. Repairs—Sand-Clay Roads—To Utilize Sewage—Los Angeles Garbage—Refuse Dump in Lake Michigan—Chicago Sanitary District Power Plant.

Repaving Versus Repairs.

Mayor Reyburn and Director Stearns, of Philadelphia, Pa., are considerably concerned regarding bills that have been introduced in councils providing for wood block paving in Arch street. One bill has passed select council, directing that the repaving shall be taken out of the fund of $600,000 paid into the city treasury by the Philadelphia Rapid Transit Company for "repairs" to streets upon which there are street car tracks. This bill provides for repaving from Seventh to Twenty-second streets, while another bill introduced provides for repaving from Seventh street to the Delaware river. The only money available is the traction paving fund, and both Mayor Reyburn and Director Stearns are convinced of the illegality of paying for repaving out of funds for repairs. A survey will probably be made of the entire city with reference to needed repairs, with the result that the number of square feet of each kind of repaving and repairs needed will be tabulated.

Sand-Clay and Earth Roads.

The U. S. Department of Agriculture, Office of Public Roads, includes in its Circular No. 91 a report by W. L. Spoon, C. E., superintendent of road construction, on "Sand-Clay and Earth Roads in the Middle West," which gives the results of experiments conducted in Kansas and the surrounding country in 1908, under the plans of the office.

Los Angeles Has a Garbage Nuisance.

In a recent number of the *Pacific Outlook*, published at Los Angeles, Cal., appears the following:

Part of the trouble over the Charles Alexander garbage contract arises out of the nuisance created by the unloading of the carts into the cars that convey the stuff out of the city; and 90 per cent. of this nuisance is unnecessary and could be corrected at a little cost and some care. To the disinterested spectator, it would seem as though the contractor and the railroad were both desirious of making things as bad as can be instead of as good as might be. The location is near Aliso street at the mouth of the Arroyo, where the Pacific Electric cars enter on their private right of way. There is a short piece of street or road leading to the place of unloading—say 150 to 250 feet long. As the wagons pass and repass over it great clouds of dust go up—filthy dust full of germs. Why is it not oiled or at least wet down? The P. E. could gravel it at small expense as it is right along the track. Then there is 100 feet of track where the loading takes place, more or less filthy all the time from fragments of garbage that fall from wagons and cars in the process. These are ground into the soil. At small expense—relatively—all this area could be made solid with packed oil gravel, or for that matter it could be filled with asphalt concrete, so it could be scrubbed clean once a day. This would do away with a large part of the smell that annoys the neighboring people and those who pass there in the P. E. cars. Then the process of unloading deserves a prize for stupidity. The wagon beds are lifted with a derrick and dumped into the cars. Only they do not dump. They hang at an angle instead of perpendicular, which makes it necessary to have men standing in the garbage to claw the stuff out with rakes—a slow, filthy performance that prolongs the smells and increases them. It would be a very simple matter to equip the beds so that they could be hung up on end and dump their contents instantly. Some of the wagons have canvas covers, but none of them seem to be large enough to completely shut in the contents—as the San Francisco wagons are arranged—and some of them have covers made of burlap, which is useless. The cars also should have canvas covers which should be drawn along and fastened in place as the filling proceeds, and there should be a sufficiency of these covers so they can be kept fairly clean. Both the cars and the wagons should be water-tight. With some such changes as these the place could be used for the loading of garbage without disturbing anybody in that vicinity, but as it is now it should be condemned by the Board of Health.

An outsider may perhaps be allowed to make a long-distance suggestion that there are in the market garbage wagon and cart bodies with tight covers which, by the installation of a light derrick could be lifted from the wagon or cart gears, piled up on flat cars, hauled to the garbage disposal plant and there emptied so that there will be no such nuisance as that described above anywhere except where it can be properly regulated. The wagon bodies can then be washed with hose or other convenient method and be returned to the loading place and replaced on the gears. Two or three times as many wagon bodies as gears might be required, so that the exchange can be made of empty for full body and no time be lost by the team.

Wish to Utilize Denver Sewage.

The Denver Irrigation and Fertilizer Company, incorporated in March by Richard L. Fuller, Charles J. Johnson, S. Roy Wright, Richard S. Fuller, Jr., and Theo-

dore Thomas, all of Denver, has in contemplation a plan for utilizing the sewage products of Denver, provided the city will sell the company a perpetual right to the use of the waste water and sewage from the city's sewerage system. The company proposes to build a system of conduits to receive the waste water and sewer discharge, convey it to a large plant north of the city in Adams county, cleanse the water by filteration, for irrigation, and manufacture fertilizer from the refuse, and dispose of that for profit.

Refuse Can Be Dumped in Lake Michigan Only Behind Breakwaters.

A final agreement has been reached by the senate and house conferences at Washington, on the Mann bill, which prohibits dumping within eight miles of the shore line of Lake Michigan, except behind breakwaters for the purpose of making land.

The great benefit derived from the law will be in the health features, but the permission to make land with the thousands of tons of refuse thrown away annually will be of great value to the city. A steady improvement of the water supply and the requirement of more parks along the lake front are counted among the other boons to be desired.

Chicago Sanitary District Makes Money in Power Plant.

In a report of the electrical department of the Chicago Sanitary District, submitted to President R. R. McCormick, it was shown that there is profit in the Chicago Sanitary District's sale of power and light current. After every deduction, including interest on the invested capital, a balance of $63,211.46 is shown. For sales of current there was received $385,564, while other items brought the gross income of $391,936. Out of this came $183,452 for operation and other expenses for the year, which includes an allowance of $46,216 for depreciation. Interest on plant and equipment was specified as $145,273.

Every month in the year, except April, showed a profit in the electrical department, and after the first four months there was a steady increase in net earnings and profits above fixed charges.

Chicago was the best patron of the Sanitary District among the dozen public institutions listed as buyers of electricity. The city paid $143,184 and the west parks came next with $15,823. Morgan Park paid $4,040, smaller sums being received from Lockport, Berwyn, North Berwyn, Cicero, Lyons, and Blue Island. Lincoln Park paid $6,240, the Isolation hospital $583, and the Cook county hospital $403.

These public institutions used 67 per cent of the current generated by the canal's flow from Lake Michigan. Of this Chicago bought 56 per cent for street lighting.

Expenditures on the plant and equipment in the year were $696,309, which brought the total outlay under that head up to $4,036,599.

Consumers of the district's current in 1909 numbered 811, of which municipalities were thirteen. Concerns buying electricity for commercial light numbered 695, mostly in Blue Island, Berwyn, and Lockport, while the purchasers of commercial power were 103. The department's employes numbered 265, of whom 99 were used in maintaining overhead lines.

Census Reports of Cities on Street Cleaning, Lighting and Water.

The Census Bureau's special annual report for 1907 on the statistics of 158 cities having a population of over 30,000 each, contains many comparisons. The section devoted to the subject of street lighting includes payments for expenses of street lighting per acre of land area and per capita; lights classified by kind, number, candle power, price for light per year; number of hours lighted per year; average number of each kind of lights to each 100 miles of streets. The report says:

The cities with the highest per capita payments for lights were Yonkers ($1.59), and Los Angeles ($1.37); and those with the largest payments per acre of land were Hoboken ($35.03), and Boston ($32). Owing to the great length of their unimproved streets, the average number of lights to 100 miles of streets is very small in some cities. Of the cities using Welsbach lights, largely in the residence districts, Boston leads in the number used in proportion to street mileage, followed by Washington, St. Louis, Cleveland, New York and Baltimore.

In comparison with similar statistics for 1905, it is interesting to note that the flat flame gas lamp is fast disappearing from use, the per cent. of decrease in number reported amounting to 43.7. This decrease has been offset by a large increase in the number of Welsbach, incandescent and arc lights.

Regarding street cleaning, it says:

Street cleaning cost New York city in 1907, $6,941,912, though a portion of the cost of refuse disposal is included in this amount. The city next in rank was Philadelphia, which paid less than a million dollars for maintaining its street-cleaning department.

Cities of over 300,000 population with a small expense for street cleaning were Milwaukee ($129,380), New Orleans ($138,993), and Buffalo ($189,683). The cities with the largest areas cleaned at least once a week were New York, 25,312,729 square yards; Philadelphia, 17,270,034 square yards, and Buffalo, 12,736,158 square yards. New Orleans had the smallest such area for cities of over 300,000 population, or less than one million square yards.

Nearly all of the area in New York, Chicago and San Francisco subject to regular cleaning was swept by hand, while most of that in Pittsburg, Detroit, Boston, and large areas in Philadelphia, Buffalo and Washington were swept by machine.

In Buffalo, St. Louis, Cincinnati and

Detroit large areas were cleaned by flushing, though this method in Buffalo was only an experiment and was continued for only two weeks. In comparison with similar figures for 1905, the area regularly cleaned by flushing shows a large increase.

On water supply systems it says:

Of the 158 cities reported, 117 owned water-supply systems whose estimated value at the close of 1907 was $647,334,495. The revenue receipts from the public amounted to $52,831,096, and the actual expenses of operation to $21,281,273. The excess of receipts over operating expenses was, therefore, $31,599,823, nearly two-fifths of which was consumed in payment of interest on the outstanding debt. The remaining three-fifths were apparently net profits, but it is impossible to argue from this result that municipally owned water-supply systems are exceedingly profitable.

Cities owning their water works do not receive taxes from them, and in few cases charge off a sufficient amount for depreciation. The report states that the financial results indicate, when these factors are taken into consideration, that few systems are operated at great profit, while some are conducted at an actual loss. Some cities, however, aim to furnish water to their citizens at cost, and it is possible that in such cities water rates are lower than they would be if the water system was owned by private parties.

ORGANIZATIONS AND INDIVIDUALS

International Road Congress—National Irrigation Congress—Society for Testing Materials—Indiana Municipal League—Technical Meetings—Technical Schools—Civil Service—Terra Alta Mayor—Personal Notes.

The International Road Congress and Association.

The Permanent International Association of Road Congresses is organizing at Brussels the Second Congress on Roads, while the Universal Exhibition is in full swing. The meeting will take place on July 31 next at the "Palais de la Nation." at Brussels.

The Congress will be divided into three sections and the languages, the use of which is authorized for discussions in either section, are German, English and French. Papers and proceedings will be printed in the three languages and delivered to all members; they form two volumes, having 1765 pages, and containing engravings and 51 plates out of text.

The association includes members from all countries; it is under the control of a permanent commission and of a permanent council, consisting of members of each State, whose number is proportionate to the amount of the annual subscription granted by their government to this undertaking.

Every member of the permanent association is ex-officio member of the congress; the subscription for the membership in the association amounts to 25 francs for the year 1910 and to 10 francs for the following years.

Write for further information to M. Mahieu, Secretaire General, 1 Avenue d'Iena, Paris.

National Irrigation Congress.

The National Irrigation Congress, which gained such wide-spread recognition at the Spokane convention last summer, will have its eighteenth session at Pueblo, Colo., September 26 to 30, under the presidency of B. A. Fowler, of Phoenix, Ariz., who has been actively identified with the organization for years. It is promised there will be several thousand delegates, including practical agriculturists and irrigationists, from all parts of the United States, Canada, also from 30 to 40 foreign representatives and diplomatists, heads of national and state departments, capitalists and engineers.

There will also be an exposition of apparatus for raising and putting water on the land and representative exhibits of products of irrigated tracts, thus bringing together in the heart of the Arkansas valley the most comprehensive demonstration of the value of irrigation in the history of the movement. Colorado has a larger acreage under ditches than any of the western states, and, as practically every approved method of distributing water is in use in that state, there will be opportunities to study the various plans of supplying moisture by artificial means to the land.

In the states from the Missouri river to the Pacific ocean there are fully 3,000,000 acres under irrigation or to be watered in the near future. Allowing an

average of 20 acres to a family and five persons to a family, this acreage will support 750,000 persons. To this number might be added 570,000 more, representing the number of persons needed to supply the wants of these tillers of the soil and to transport their products.

American Society for Testing Materials.

The thirteenth annual meeting of the American Society for Testing Materials is held at Atlantic City, N. J., June 28, 29, 30, July 1 and 2. Reports from all the standing committees are presented, with a number of papers upon each subject. The papers include the following: "Some Recent Tests of Cast Iron," by A. E. Outerbridge, Jr.; "The Forest Products Laboratory, Its Purpose and Work," by McGarvey Cline; "Measured Strains in a Steam Boiler Under Hydrostatic Tests," by James E. Howard; "Tests on Steel and Wrought Iron Beams," by H. F. Moore; "Strength of Steel from I-Beams," by E. L. Hancock; "Aluminates: Their Properties and Possibilities in Cement Manufacture," by Henry S. Spackman; "The Effect of Sodium Silicate Mixed with or Applied to Concrete," by Albert Moyer; "Comparative Tests of Lime Mortar, Both in Tension and Compression; Hydrated Lime and Sand, Lump Lime and Sand, and Cement, Lime and Sand," by E. W. Lazell; "Tests on Reinforced Conrcete Columns Subjected to Repeated and Eccentric Loads," by O. M. Withey; "The Distribution of Stress in Reinforced Concrete Beams, Including a Comparative Study of Plain Concrete in Tension and Compression," by A. T. Goldbeck; "A Sand Specification and Its Specific Application," by W. A. Aiken; "A Method for Testing the Protective Power of Paints When Applied to Iron and Steel," by W. H. Walker and M. T. Jones, Jr.; "Another Solubility Test on Protective Coatings," by G. W. Thompson; "The Painting of Cement and Concrete Structures," by Charles MacNichol; "Classification of Fine Particles According to Size," by G. W. Thompson; "The 600,000-lb. Testing Machine of the University of Wisconsin," by H. F. Moore and M. O. Withey; "Apparatus for Repeated Loads on Concrete Cylinders and a Typical Result," by H. C. Berry; "The Determination of Soluble Bitumen," by Prevost Hubbard and C. S. Reeve; "Improved Instruments for the Physical Testing of Bituminous Materials," by Herbert Abraham; "Necessary Reforms in Specifications for Petroleum Products," by Albert Sommer; "A New Machine for Testing Pitch," by T. Y. Olsen; "Fuel Investigations, U. S. Geological Survey; Progress During the Year Ending June 30, 1910," by J. A. Holmes.

Officers for the ensuing term (1910-12) are as follows: President, Henry M. Howe; vice president, R. W. Lesley; secretary-treasurer, Edgar Marburg; member of the executive committee, James Christie.

Indiana Municipal League.

The convention of the Indiana Municipal League was held at Richmond, Ind., June 21, 22 and 23. A banquet was given by the Commercial Club, complimentary to the delegates. Responses were made to the toasts, as follows:

"Richmond," Mayor W. W. Zimmerman; "The Commercial Club's Relation to City Government," Lemuel Darrow, mayor of Laporte; "Some Shop Talk," Mayor Samuel Lewis Shank, of Indianapolis; "Municipal Honesty," James W. Fortune, city attorney, Jeffersonville; "Municipal Laws," Senator Will R. Wood, Lafayette; "Making Municipal Government an Asset," John McVickar, Des Moines, Ia.; "The Municipal League," Lawrence Becker, mayor of Hammond; "Civil Service Reform in Municipalities," William Dudley Foulke.

During the convention W. A. Dehority, examiner of public accounts, in an address relative to the work of his department, said:

The training of the majority of men elected to public office has been on an altogether different line from that which they are to assume. An officer observes the manner in which his predecessor has been conducting the affairs of the office, and usually proceeds on the same line. As a result, within the various counties, cities and towns, many methods of accounting have been in use; in fact, in many places the only financial record to be found are the bank pass books, some of them being in a very chaotic condition.

Because of improper methods of accounting, reporting and investigating, many officers were at the close of their terms compelled to sacrifice their property or call on their bondsmen to liquidate a shortage which did not really exist. The repressive effect of the public accounting law will reduce such to a minimum. In such a case the damage has been both monetary and moral, to the chagrin and detriment of the officer and his friends, all without intent on the part of the accused. In one county an officer was short more than $40,000. The officer was convicted for embezzlement and sent to prison, where he served one year. There was absolutely no evidence of the officer being benefited on account of misappropriation of the funds. The entire matter was charged to an extravagant clerk, who also served a term in prison.

An ex-township officer deposited in a bank the amount of $661.47, but had neglected to account for it on his records. This condition was not known, and the township was without the funds until discovered by field examiners representing the department of inspection and supervision of public accounts.

An investigation of the records of the township officers and one city office in twenty-three counties shows apparent shortages and misapplied funds in the amount of $120,092.94. Since the examination of these accounts a reimbursement was made of $22,309.47. The total cost of examinations was $16,855.92.

The object sought by the Municipal League and the results hoped for are no

doubt the honest, thorough practical, legal administration of municipal affairs. These results can be attained in a measure through the medium of the public accounting law, with the co-operation of the good people of Indiana in general and the Municipal League in particular. An honest administration of public affairs is demanded, and through the board of public accountants every public official is bound to give a strict account of his stewardship.

The law demands that public accounting shall be efficient and expeditious, that there be a complete statement to the taxpayers of each and every transaction. It demands that public accounts be kept in a practical manner to the end that the interested citizen may be able, upon inspection of the records, to fully understand them. It insists that in the conduct of public officials the laws be obeyed in spirit, and not conducting the affairs of public office along the lines of personal opinion, regardless of the statutes of Indiana and contrary thereto. When in the adoption of uniformity of system and practicability in administration, improvements are found necessary that will benefit the public at large, the same will be brought to the attention of the general assembly for incorporation into the accounting law of the state of Indiana, and the same can be more readily accomplished by the united and enthusiastic support of your organization.

Mayor Burke, of Jeffersonville, discussed "Public Improvements;" Dr. J. N. Hurty, secretary of the State Board of Health, talked on "Sewage Disposal;" A. M. Gardner, city attorney of Richmond, "Municipal Ownership and Franchises;" J. A. Gavitt, city attorney of Hammond, "Public Utility Commission;" H. C. Hogan, of Ft. Wayne, "Track Elevation."

Officers were elected as follows: President, Lemuel Darrow, mayor of Laporte; vice presidents, Jas. E. Burke, mayor of Jeffersonville, and John Thom, of Noblesville; treasurer, Loren Mellette, of Elwood; secretary, F. B. Robinson, city clerk of Crawfordsville.

The meeting next year will be held at Crawfordsville.

Technical Meetings.

The Montana Society of Civil Engineers was organized recently at a meeting held at Helena. Officers were elected as follows: President, Robert H. Lindsay, of Butte; vice president, Robert Liblery, of Missoula; secretary-treasurer, Arthur Ireland, of Helena. The first regular meeting of the society will be held the second Saturday in Jenuary, 1911.

The annual convention of the Ohio Electric Light Association will be held at Cedar Point, O., July 26, 27 and 28. D. L. Gaskill, secretary, Greenville, O.

The second annual convention of the Pennsylvania Engineers was held at Harrisburg, Pa., June 1, 2, 3 and 4, under the auspices of the Engineers' Society of Pennsylvania. One of the matters to receive much attention was the affiliation of all the engineering interests of the commonwealth by the adoption of a general form of constitution and by-laws and uniform standards of membership for the various local engineering organizations. A representative form of government is to be adopted in this proposed federation. The formulation of a professional code of ethics and the control of the practice of engineering in the state by legislation, received consideration, but no definite action was taken. Among the papers read at the meeting were the following: "The Improvement of the Highways of America," was to have been presented by Logan Waller Page, director of the Bureau of Highways, U. S. Department of Agriculture, but owing to his absence a paper was read by L. E. Bopkin, of the Bureau of Highways; "Road Work in Pennsylvania and Some of Its Problems," by Joseph W. Hunter, State Highways Commissioner of Pennsylvania; "The Melville Mac Alpine Reduction Gear," by J. A. MacMurchie; "Sanitation," by Dr. Samuel G. Dixon, State Commissioner of Health.

The Year Book for 1910 of the Merchants' Association of New York has been issued.

The Ohio Valley Exposition will be held in Cincinnati, August 29 to September 24.

The annual report of the Merchants' Association of San Francisco tells of the valuable work of this public spirited association during the year.

The proceedings of the third annual convention of the Indiana Sanitary and Water Supply Association have been issued by Frank C. Jordan, the secretary, who is also secretary of the Indianapolis Water Company. It is a well printed volume of 145 pages and contains a remarkable series of papers and discussions to have been presented in the three sessions of a single day.

The proceedings of the 22d annual meeting of the Iowa Engineering Society have been issued by secreary S. M. Woodward, Iowa City.

The Merchants' Association of New York has been arranged for reduced rates to New York at four dates in July, August and September in Trunk Line territory, with 15 days return limit and at four dates in July and August in Central Passenger Association territory with 30 days return limit, on terms explained in the association's circulars. There will also be summer session tourist fares from the western part of the territory named.

The forty-second annual convention of the American Society of Civil Engineers was held in Chicago on June 21-24, inclusive, at the Congress Hotel. Mr. John A. Bensel delivered the annual presidential address and a special committee reported on legislation affecting engineering practice. Mr. Alfred Noble gave an illustrated talk on the New York terminal of the Pennsylvania Railroad, and Mr. J. Waldo Smith one on the new water supply of

New York City. At the final meeting there was an illustrated lecture on the recent plans for the general artistic betterment of Chicago.

The remaining time of the convention was devoted to excursions to the municipal park system, the Gary steel plant, the regulating works and power plant of the drainage canal at Lockport, the new passenger terminal of the Chicago & Northwestern Railway, the central stations of the Commonwealth Edison Company, the mail order plant of the Sears-Roebuck Company, the new plant of the Western Electric Company, the army post at Fort Sheridan and the naval training station at Lake Bluff.

The New York Electrical Society held its annual meeting at the new station of the Pennsylvania Tunnel and Terminal Railroad Co. on June 15, and made a thorough inspection of the plant. Robert T. Lozier was elected president, Geo. H. Guy, secretary, and Henry A. Sinclair, treasurer.

President Baxter of the American Society of Engineering Contractors has appointed a committee on uniform specifications of which W. R. Harris, Louisville, Ky., is chairman. About thirty subcommittees of one or two members each have been appointed to aid in the work.

The Technical Schools.

The Baldwin Prize for the best essay on a municipal subject offered by the National Municipal League has been awarded to Oswald Ryan, an undergraduate student of Harvard University. Honorable mention was made of the essays of E. Clyde Robbins, of the State University of Iowa, and Roger F. Hooper of Harvard. Thirty-eight essays were submitted. The subject treated was "The Commission Form of Government."

The announcement of the graduate school of Cornell University for 1910-11 is contained in *The University Records* for April.

The University of Illinois Bulletin, Water Survey Series No. 7, contains the report of 1908 of Edward Bartow, director of the chemical and biological survey of the waters of Illinois.

City and town promotion is the subject of a course now offered by the Extension Division of the University of Wisconsin. The course points out that no business can outgrow its city or district, and that with the advance of the section in which it is located. The history of the work of business men's associations is dwelt on, and the discussion of their organization and methods forms the chief part of the course. The topics treated are: Promotion for the city, town, and village; becoming the center of a district; stimulating surrounding country; widening trade area; agricultural developments; markets and exchanges; rendering a city attractive; unconscious psychological effects; the publicity bureau; attracting residents; attracting manufactories; improving business conditions; business men's associations; organizing and conducting the work of promotion. Benjamin H. Rastall, Associate Professor of Business Administration has charge of the work in this course. Further information can be secured by addressing the University Extension Department, University of Wisconsin, Madison, Wis.

Civil Service Examinations.

The U. S. Civil Service Commission will hold examinations at the usual places as follows:

July 13. Assistant Engineer in Reclamation Service at $1,500 and upward and Junior Engineer at $900 and upward.

July 20,21: United States Surveyor in the General Land Office at $100 a month, traveling and subsistence expenses when in the field.

July 27, 28: Topographic draftsman in Coast and Geodetic Survey at $900 to $1,500. Copyist draftsman at $900 to $1,500.

Mayor of Terra Alta Resigns.

Declaring that any man who could preside as mayor and indulge in intimate association with the members of the city council of that city without losing his temper and better judgment was ready for immediate transition, Dr. S. M. Scott, Sr., resigned as mayor of Terra Alta, W. Va., June 13. The difficulty arose over a quarrel between the mayor and the city sexton, the mayor being in favor of keeping the cemetery gates locked.

Personal Notes.

Dr. Calvin Anderson, mayor of Madison, N. J., died May 26, of heart disease.

S. Y. High has been appointed superintendent of the water department at Haines City, Mo.

Palmer Campbell has been reappointed a member of the County Park Commission, at Jersey City, N. J.

W. Mahlon Davis, of Berlin, Ont., has been appointed city engineer of Prince Rupert, British Columbia.

W. S. Sanford has been elected to fill out the unexpected term of Mayor Green, resigned, at Griggsville, Ill.

Col. Wm. H. Bixby has been appointed Chief of Engineers of the U. S. Army, in place of Gen. Wm. L. Marshall, retired.

Roy F. Weirick has been appointed landscape engineer in the department of parks and public buildings, at Des Moines, Ia.

Robert L. Burwell and Arthur L. Reeder have been appointed designing engineers on the water board, at Baltimore, Md.

George A. Hibbard, former mayor of Boston, Mass., died May 29, at his home in the Ashmont district, of tuberculosis, aged 46 years.

T. C. J. Bailey, Jr., head of street extensions, District of Columbia, has been appointed engineer of bridges, succeeding W. J. Douglas, resigned. J. W. Dare will have charge of the street extension work, under the direction of M. C. Hazen, district surveyor.

Leander Schadt has been appointed city engineer, and Ernest Hartman assistant city engineer and superintendent of streets at Cumberland, Md.

Henry A. La Chicotte, principal assistant engineer in the department of bridges, New York City, has been appointed deputy chief engneer.

N. P. Anderson, city surveyor of Brigham City, Utah, was drowned in the Logan river, June 4, while returning from a surveying expedition in Logan Canyon.

N. A. Carle, M. Am. Soc. M. E., Assoc. M. Am. Soc. C. E., has opened an office in Seattle, Wash., as a consulting engineer in mechanical, electrical and mining engineering.

H. von Schon, consulting engineer, Detroit, Mich., has been engaged by the West Indies Electric Company, Ltd., to prepare plans for a hydro-electric plant near Kingston, Jamaica.

A. J. McPherson, of the Saskatchewan Provincial Public Works department, and consulting engineer to the City of Regina, Sask., has been appointed one of the new municipal commissioners.

S. M. Gunn, head of the health department of Orange, N. J., for three years, resigned June 6 to accept a position in the sanitary engineering faculty of the Massachusetts Institute of Technology.

W. J. Douglas, M. Am. Soc. C. E., has resigned as engineer of bridges, District of Columbia, to become associated with William Barclay Parsons, consulting engineer, 60 Wall St., New York City.

Robert H. Fuller has been appointed a member of the New York State Water Supply Commission, succeeding Dr. Ernst Lederle, who resigned in January to become health commissioner of New York City.

Samuel Whinery, consulting engineer, New York City, has been retained by the commission on city expenditures of Chicago, to report on the present conditions and possible improvements in the street department.

The Morgan Engineering Co., 612 Goodwyn Institute Building, Memphis, Tenn., has been organized by Arthur E. Morgan and L. L. Hidinger, to practice hydraulic and drainage engineering, with special reference to the reclamation of swamp lands.

John Duder, Assoc. M. Am. Soc. C. E., and assistant city engineer of Salt Lake City for the last four years, has resigned to become crief engineer in charge of the practice of the Birch Company, engineers, of that city.

Prof. Ira H. Woolson of Columbia University, who has been in charge of the laboratory for testing building materials, especially by fire, has been appointed consulting engineer to the National Board of Fire Underwriters.

Thomas H. Ferguson has resigned his position as patent attorney for the Kellogg Switchboard & Supply Company, of Chicago, and has opened offices at 1443 Marquette Building, Chicago, for the practice of Patent Law.

George R. G. Conway, M. Am. Soc. C. E., formerly chief engineer of the Monterey Water & Drainage Co., of Monterey, Mex., has opened an office to practice as hydraulic and sanitary engineer, at 514 Paulsen Bldg., Spokane, Wash.

Charles E. Perkins has established an office at Akron, Ohio, and will practice civil engineering. Mr. Perkins retired, May 21, from the office of chef engineer of the public works of the State of Ohio, which position he held for 18 years.

Arthur H. Blanchard, M. Am. Soc. C. E., Associate Professor of Civil Engineering at Brown University, has recently resigned from the position of Deputy Engineer of the State Board of Public Roads of Rhode Island. Professor Blanchard will remain in Europe until after the sessions of 2nd Congres Internationale de la Route and continue his investigations of the construction and maintenance of bituminous surfaces and bituminous pavements.

The peculiar and difficult drainage problem of the city of Louisville, Ky., which several times a year has to endure flooding from the three-branched Beargrass Creek that flows through the eastern part of the city is the subject of a lengthy report by Harrison P. Eddy, civil engineer, of Boston, and J. B. Breed, chief engineer, of the city of Louisville. The work recommended consists in the construction of masonry lined channels for the creek, removal of obstruction by highway and railroad bridges, and some improvements in the sewer service.

MACHINERY AND TRADE

The Goodwin Portable Asphalt Plant.

W. S. Goodwin, Box 95, Times Square Station, New York City, has devised a convenient and satisfactory plant for heating and mixing asphalt pavement materials on the street of which the following is a description:

The heating and mixing drums are placed in a casing; in the same casing, immediately above are situated the two melting kettles. The entire interior of the casing is heated by fuel oil, giving a constant uniform temperature entirely around both drums, the bottom and four sides of the melting kettles.

As the entire casing or housing is lined with heavy asbestos, the full benefit of the heat generated by the fuel oil is obtained. The machine, being duplex, does the work of two machines; while the material is being heated and mixed in one drum other materials are being

placed in the other drum without the loss of time by laborers, thus allowing the drums to discharge the hot mixtures alternately.

Placed in front of the housing and on same frame, are the boiler and steam engine, or a fuel oil engine, whichever may be desired. The latter has the following advantages: $4.00 to $6.00 per day saved in fuel; no fuel expenses except during operation; no licensed engineer or fireman is required.

These fuel oil engines should not be confused with those using dangerous gasoline, naphtha, benzine or those having troublesome electric igniters and delicately exposed parts, as the crank shaft and other moving parts are entirely enclosed, making the machine dust proof and especially adapted to this class of work.

This plant is also equipped with a fuel oil tank having sufficient capacity for a day's supply for the engine, also a day's supply for heating the mixing drums and melting kettles.

An air compressor is supplied, also a tank for same, sufficiently large to operate the oil burner and agitate the material in the melting tanks. This compressor is directly connected and thoroughly protected from the weather. A water tank is provided for supplying water to either the oil engine or steam boiler.

In transporting the plant by rail the upper railing and the small stack are detached. The plant is then hauled on its own wheels to a flat car and by the use of skids from the end of the car and a block and tackle, the plant is placed on the car ready for shipment.

In operation the plant is placed on, or adjacent to, the roadway under construction and within wheeling distance for the barrows. Sufficient materials and supplies for two days' paving are placed convenient to the plant.

The proper proportion of the two or more different size stone and sand is measured in batches, in one of the several simple ways, and then shoveled into either one of the hoppers leading to the heating drums.

When the moisture has been driven off the sand and stone and they are sufficiently hot, the proper amount of hot bitumen is introduced into the same mixing drum by gravity from the measure placed on the opposite side from the stone and sand hoppers.

When the materials are thoroughly mixed and the proper temperature obtained, the door at the end of the drum is opened and the contents of the drum automatically discharged into wheel barrows placed on the side of the plant when they are immediately wheeled to the place of operation.

The man situated on the top of the housing attends to the placing of the stone and sand alternately into the drums, also runs the proper amount of hot bitumen from either tank in the measure.

The melting tanks are filled by the use of the lift on top of the housing, which brings the bituminous material from the ground and places it in the tanks, where it is melted and then run by gravity into the measure.

The drums, revolving independently of each other, are under the supervision of the plant engineer, who stops either one of them when the doors are opened or closed.

The capacity of any plant for heating and mixing materials of this class depends principally on the amount of moisture in the mineral aggregates, the melting point of the bitumen, the climatic conditions and the efficiency of the plant used.

Under ordinary conditions this plant will heat and mix 70 tons of a mixture composed of stone, sand and bitumen in ten hours, or 600 to 700 square yards of pavement.

Mr. Goodwin will send further information on request.

The Gas Directory.

Brown's "Directory of American Gas Companies" ($5) gives statistics about companies making all kinds of gas, well classified and arranged and with a new index, which makes the book even more convenient than heretofore. The 1910 edition has over 500 pages, at least a hundred more than the previous edition and gives every indication, after comparison with the last edition, of being strictly up-to-date. An interesting appendix of nearly 70 pages gives detailed information about a number of the large companies.

There are lists of members of the numerous gas associations and a list of books for gas men in other appendices. The book is even better worth its price this year than heretofore.

Minwax Waterproofing.

The Minwax Company, Townsend Building 1123 Broadway, New York, have a refinery in Brooklyn at which the product of their mine is received and refined under the supervision of A. B. Harrison, who has spent five years in the development of the product and has reduced the refining process to an exact science. Several grades of waterproofing are prepared for various conditions and uses, as follows:

Minwax below-grade waterproofing is a tough, flexible, elastic fabric saturated with Minwax and applied with Minwax hard waterproofing, swabbed or hot. It is intended mainly for subsurface work.

Minwax subway cloth No. 55 is impervious to gas-drip and like disintegrating conditions.

Minwax structural steel coating No. 100

is made in black and olive green and can not be removed from the metal except by solvents not prevalent in building construction.

Minwax damp-proofing No. 300, forms a tough, black, rubber-like waterproof skin over the suface, to which plaster will bind.

Minwax stone backing is similar, is applied with a brush also, and will prevent staining by Portland cement.

Minwax clear waterproofing is a clear mineral liquid which enters a porous surface and fills the voids.

There are also Minwax coatings No. 55, No. 200 and No. 500, for special applications to metal, wood, roofs, hot surfaces, etc., also vault light and bridge cements. The company will send full information and a book of specifications on request.

Removal of Fisher Hydraulic Stone and Machinery Co.

The Fisher Hydraulic Stone and Machinery Company, of Baltimore, Maryland, owing to a fire at their Eastern factory, has found it necessary to transfer both the manufacture of their machinery, and the general working force of the office to the western office at Mt. Gilead, Ohio, and from that point all business of the company will have prompt and careful attention. All communications should be addressed direct to the Fisher Hydraulic Stone and Machinery Company, Mt. Gilead, Ohio, saving delays of passing through the office in Baltimore to come before the general manager.

Drilling for Water.

A booklet published by the Keystone Driller Co., of Beaver Falls, Pa., gives a very valuable practical discussion of the subject of drilling wells for water, which should be read by every one interested in this subject. It shows the advantages of a drilled well over a dug well, and shows the conditions which may make a drilled well a flowing well.

Good arguments are made for starting a well for a domestic supply with a 5⅝ or 6-inch pipe.

The defects in bored and driven wells, or in driving a small well to rock and then drilling are clearly stated. And the advantages of a large well for domestic service as storage for a small inflow of water are also shown.

The general principles of the art of drilling are detailed, with full descriptions of the tools and the methods of using them and the process of drilling is followed from the setting up of the machine through the handling of the tools, dressing the bits, handling the temper screw to the use of the sand pump and bailer. The writer knows of no more thorough treatment of the subject in print.

Then follow equally clear descriptions of all the parts of the Keystone drilling apparatus and its peculiar advantages, which is supplemented by a question department in which the usual questions of prospective purchasers are answered.

The second part is an illustrated descriptive catalog and price list. One interesting tool is a percussion core drill.

Even if one is not contemplating an immediate purchase he will find it worth while to send to the company for this catalog, No. 1.

Miracle to Marsh.

The business of the Miracle Pressed Stone Co., of Minneapolis, Minn., has been transferred to the Marsh Company of 970 Old Colony Building, Chicago, Ill., who will hereafter supply the long line of concrete and concrete block machinery developed by the former company. The Miracle brothers have long been identified with extensive contracting operations and will give their entire attention to that business. Mr. George C. Marsh is well known to concrete machinery interests, and the business will not suffer by the transfer, as he is probably as worthy a successor as the Miracle Company could have selected.

The Development of Wooden Stave Pipe.

BY SHIRLEY BAKER, M. AM. SOC. C. E., SAN FRANCISCO, CAL.

Although the first use of wooden pipe of the present day type is of comparatively recent date, bored logs were extensively used by our forefathers for carrying water under pressure. These log pipes, however, were made in small sizes, not exceeding four and five inches in diameter. Soon the increased demands of civilization called for larger conduits, and longer pipe lines to reach up into the mountains to the source of greater, purer supply. Necessity, therefore, developed the type of wooden pipe now being built, known as "continuous stave pipe," which is widely used in irrigation, penstocks for hydro-electric developments and municipal water supply, and is built in sizes from ten inches to ten feet, and more, in diameter.

This pipe is made up of a sufficient number of staves to complete the circle of desired diameter, each stave being "saw-kerfed" at the ends. In these saw-kerfs, or slots, are seated metallic tongues, which, when the staves are "driven back," form a tight butt joint. The seam joints between staves are made tight by banding the pipe with round steel rods, varying in size from three-eighths to one inch in diameter, depending on the size of the pipe. Each rod is made a complete band by means of a malleable iron shoe, or lug, engaging the headed and threaded ends, nut and washer of the rod. So the present type of wooden pipe differs materially from its bored log ancestor by being banded by these steel rods.

When asked as to the life of a "con-

tinuous stave pipe," some wooden pipe manufacturers cite the finding of the old bored logs in London, New York and many other places, where they have been "dug up," after perhaps a century in the ground, and the wood found to be in an almost perfect state of preservation. This, of course, is not a fair comparison, as the bored log presented no steel to corrode or rust away.

In considering the life of continuous stave pipe, let us first discuss the stave or wooden portion:

in as careful a manner as economically possible.

The writer's experience in wooden pipe construction covers a period of some eight years, and during this time effort has continually been made to find the most effective protective coating for the metal portions of wooden pipe, such coating to be tough, durable, to resist chipping or scaling off, and at the same time to be economical.

During the last six years, on the construction of a number of wooden pipe lines

WOODEN STAVE PIPE LINE IN PROCESS OF CONSTRUCTION.

So many structures have existed for years, depending for their stability on wooden piles or grillage placed below "low water mark" that it is accepted as a truth, "wood kept saturated with water will not rot." Therefore, under ordinary conditions, the life of continuous stave pipe, when kept constantly full, its staves saturated, becomes the life of the steel bands encircling it. The life of the steel bands can be greatly prolonged if the metal is covered with some protective coating. It is, therefore, of the utmost importance that this coating, to prevent corrosion, should be selected and applied

under his supervision, "Pioneer" mineral rubber pipe coating has been very successfully used as a hot dip for coating the bands, and "Pioneer" field paint as a cold application for retouching spots that become abraded during construction; both these materials being manufactured by the American Asphaltum and Rubber Co., of Chicago. Based on experience and use, the writer is unhesitating in his praise of "Pioneer" mineral rubber pipe coating and "Pioneer" field paint, as fulfilling effectively the rigid requirements of a protective coating on the metal portion of wooden pipe.

The Mueller Water Tapping Machine.

How long will Mueller water tapping machines last? The makers themselves cannot tell. They know that they will last for years. They know this fact so well that each machine is unconditionally guaranteed. That, of course does not mean that a machine will last a lifetime. Few articles manufactured for daily use will, yet it seems that the Mueller company could guarantee this and their machines would actually make the guarantee good.

At a recent National Convention of the American Water Works Association held in New Orleans, there was exhibited a Mueller water taping machine that had seen thirty years' hard service. With it were shown tools that had been used with the machine for eighteen years. The machine and tools were the center of much attention, and much favorable comment. The machine and tools were loaned for the exhibit by their owner, Mr. Frank Morrison of Bloomington, Illinois, who feels as much pride in the service this pioneer tapper has given him as does the company in the way it has upheld their reputation. The satisfaction that Mr. Morrison felt in his machine prompted a volutary letter to the Mueller company last January, in which he said:

I have in my possession one of your water tapping machines I have had in use for the past thirty years, never failing to make a tap on every water service installed by me in all these years. I can truthfully say this machine has not cost me for repairs, not to exceed $10.00, is now in first class condition and is good for a great many more years.

Specifications for the Bitu-Mass Pavement.

Following are the specifications for bitu-mass pavement, which has recently been added to the pavements for which bids are to be received for improving Indianapolis streets:

Foundation—The earth foundation or sub-grade will be brought to an even surface, parallel with the grade proposed for the pavement, by making the necessary excavation or embankment. Soft or spongy earth, or other material not affording a firm foundation, will be removed and the space refilled with dry earth, which shall be solidified by ramming or rolling. Any portion of the earth foundation not accessible to the roller shall be thoroughly compacted by ramming. When the rolling and ramming shall have been done, the surface of the earth foundation shall be true and smooth, and five (5) inches below the proposed finished surface of the pavement.

Excavated Material—The earth or other material excavated as hereinbefore described shall be placed in piles along the center or sides of the roadway thus excavated. This material shall contain approximately fifty (50) per cent. of mineral matter. (By mineral matter is meant gravel, broken stone, slag, etc.) If, in its original state, it contains less than this percentage, sufficient gravel, stone or slag shall be mixed with it to bring the aggregate up to this amount.

Gravel—Any gravel to be used shall be clean pit or river gravel. The same shall be screened and any particles removed that measure above one (1) inch in any direction.

Broken Stone—If broken stone is used, the same shall be a hard, sound and acceptable stone, and shall be a natural mixture of the various sizes as coming from the crusher, except that all stones above one (1) inch shall be removed.

Pavement—The completed pavement shall be five (5) inches in thickness and shall be made as follows:

The earth and mineral matter as above described shall, before being mixed with the bituminous cement, be passed through a rotary dryer and there subjected to direct heat for the purpose of expelling moisture, and for the further purpose of causing these ingredients to readily unite with the bituminous cement. Before being discharged from the dryer the earth and mineral matter shall be heated to a temperature of approximately 250 degrees. The bituminous cement to be heated to approximately the same temperature.

Bituminous Cement—The bituminous cement used in this mixture shall be carefully prepared pitch, made from the highest grade of coal tar obtained in the manufacture of gas, in which no petroleum, water gas or other enricher is used, and refined by such process and apparatus as will accomplish uniformity of result and remove, as far as practicable, light oil, naphthalene and other matter susceptible to atmospheric influences. No pitch that has been cut back or softened by the use of light oils shall be used, and no cement shall be used which contains in excess of 38 per cent. of sooty matter or free carbon, or less than 24 per cent. of the same. No pitch made from water gas, coke oven or process tars shall be used.

Any cement that, after pouring on a blotter while heated to 250 degrees F., and run out into a sheet, will crack when bent, after being plunged into water at a temperature of 45 degrees F., shall be rejected. The ductility and consistency of the cement shall be as follows:

1. If a cylinder of the pure cement, at the temperature of 75 degrees F., one-half inch in diameter and one inch long, be held between the fingers of each hand and stretched, the same shall draw into a strand at least 3 feet long without breaking.

2. The consistency or penetration of the cement shall be as follows: Take a metal cylinder 10 inches long and 2 inches in diameter, closed at one end, except a hole in the center of the bottom, into which a smaller metal cylinder, 1 inch long and ⅝-inch bore may be screwed, projecting into the larger cylinder ⅛ inch, with a standard thermometer fastened on the inside of the larger cylinder. Fill the small cylinder with a plug of the cement and screw in place; hang the cylinder in an upright position and fill with water at a temperature of 78 degrees F., and keep same at that temperature. If the water forces a hole through the cement in from 100 to 150 seconds, the consistency is suitable; otherwise, it shall not be used.

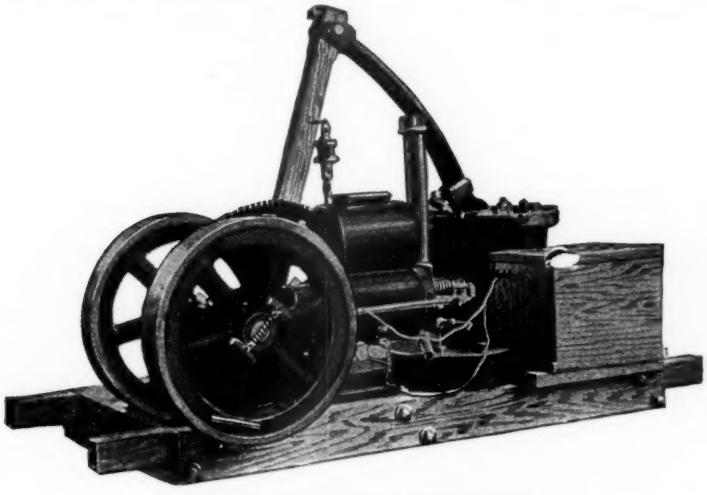
The bituminous cement shall at no time be heated to exceed 250 degrees F. When the compounding of the mixture is taking place, the mixture shall be of the temperature of between 180 and 250 degrees F.

The amount of the bituminous cement to be used is determined by the amount required to thoroughly coat each particle of the earth and mineral matter, and to fill the remaining voids in the mixture.

After the formula is thus obtained, giving the exact amount by weight of the earth and mineral matter and the exact amount of cement for one batch, the same shall simultaneously be dumped into the mixer and the whole compound thoroughly agitated until all the particles are thoroughly covered, and the combination is a uniform bituminous concrete.

In this condition it shall be spread on the prepared foundation or sub-grade in two courses or layers, as follows: The first or lower course shall contain a slightly larger percentage of the cement than the second or upper course, and shall be at least three (3) inches in thickness after being thoroughly compressed by rolling with a steam roller weighing at least eight (8) tons. The second or upper course shall then be spread on top of the lower course to such a depth that, after thorough compression with a steam roller weighing at least eight tons, the two courses (or the entire pavement) shall have a thickness of five (5) inches.

Guarantee, Maintenance and Bond—All the conditions of sections 36, 37, 38 and 46 of the General Specifications in reference to guarantee, maintenance and bond for modern city pavements shall also apply to this pavement.



A PORTABLE TRENCH POWER PUMP.

A Powerful Portable Trench Pump.

The accompanying cut shows a portable diaphragm bilge trench pump, operated by a strong 3-h.p. gasoline engine, which has some very strong points of advantage. Pump and engine are mounted on a strong skid, which is easily moved by means of the projecting handles.

The wrist pin on the gear wheel has four points of attachment, giving four different strokes, and the revolutions of the engine can be regulated to run the pump at 30 to 50 strokes a minute, and will pump from 3,000 to 3,500 gallons an hour. The pump is strong and simple in design, can be run night and day, and, it is claimed, will pay for itself on one job, being much more economical than one run by hand. Full information about the pump will be given by the manufacturers, the C. H. & E. Manufacturing Co., 321 Mineral st., Milwaukee, Wis.

Contract for Bitulithic Pavement Awarded by New York State Highway Commission.

The long campaign to secure the improvement of Main street, through the village of Whitesboro, ended successfully when the State Highway Commission at Albany on May 27, awarded the contract to Warren Brothers of Boston for the construction of a bitulithic pavement 1.60 miles in length. The bid of Warren Brothers was $64,510, which was lower than any other bid presented for either brick or bitulithic pavement and lower than the estimated cost, which was $79,000. The list of bids received by the commission was as follows: Bitulithic—Warren Brothers' Company, Boston, $64,510.80; John R. Baxter, jr., Utica, $78,352; H. R. Baurgart Company, Buffalo, $70,000. Brick—Central City Paving Company, Syracuse, $72,000; James W. Johnston, Utica, $65,700; Frank L. Cohen, Buffalo, $72,400; John R. Baxter, Utica, $68,120; W. V. Bardol, Buffalo, $73,000; Harry W. Roberts, Utica, $67,870; H. R. Baurgart Company, Buffalo, $67,000.

President George Haynes, A. M. Waterbury, R. A. Jones and James Corbitt of Whitesboro appeared before the commission and urged the acceptance of Warren Brothers' bid, as the people of the village had signed a petition asking for bitulithic pavement. Warren Brothers are a well-known firm. They laid many of the asphalt pavements in Utica. Re-

cently they have been engaged in constructing bitulithic pavements and have put them down in many places, including Rome and Herkimer, where they have been thoroughly tried and have proved highly satisfactory.

With this new pavement the appearance of the village will be transformed, and as the state and the trolley company will pay the major part of the expense the burden upon the taxpayers will be easily borne. The pavement will begin at the Sauquoit Creek and extend to the westerly limit of the village.

The Cube Mixer for Concrete.

The Austin improved cube concrete mixer, by its change of name from the Chicago cube mixer, puts the credit for the machine where it belongs, for the Austin company, the Municipal Engineering and Contracting Co., has developed the machine and advertised it until it is now perhaps the best known of the concrete mixers, as it is the simplest in form and operation. It is made of numerous sizes and designs to suit all kinds of work, and is fitted with steam or gasoline power and with various hoppers and measuring boxes for supplying it with materials, so that the demands of any contractor can be met.

Its well-known freedom from any fixed or moving vanes or parts inside the cube, and consequent cleanliness, its thorough mixing of the concrete by the buffeting given it by the sides of the cube revolving on a line through opposite corners, have given it a pre-eminence which it is difficult for other mixers to reach. Ask the company for catalogs and full information at its office in the Railway Exchange Building, Chicago, Ill.

Validity of Bitulithic Patents Confirmed in Grand Rapids and Other Cases.

Following the decision in the Owosso case, of Mr. Justice Lurton, formerly the presiding Justice of the United States Circuit Court of Appeals for the Sixth Circuit, but now a member of the Supreme Court of the United States, Justice Denison of the United States Circuit Court for the Western District of Michigan has just entered a decree in the case of Warren Brothers Company vs. The City of Grand Rapids and Kloote and Van der Veen, Contractors, in which it is adjudged:

Claims 5, 6, 9 and 11 of said patent No. 727,505 are valid, and a pavement constructed under the specifications adopted by said City of Grand Rapids for the improvement of Lyon Street, Park Street and West Park Place, as set forth in the bill of complaint, would necessarily constitute an infringement of one or more of the claims of said patent.

That the defendants and each of them, their servants, agents, attorneys, workmen and employes, be and they hereby are perpetually enjoined and restrained from directly or indirectly making, using, vending, or selling to others to be used, said improvements and inventions as described and claimed in the 5th, 6th, 9th and 11th claims of said Letters Patent No. 727,505, or any material or substantial part thereof, except as to the construction of the pavement on the streets in said City of Grand Rapids hereinabove named, to-wit: Lyon Street, Park Street and West Park Place,

A license having been granted to Kloote & Van der Veen and royalty paid for the use of Warren patents on the streets above referred to.

This decree of Judge Denison is in line with the decrees heretofore entered by Judge Pollock against the Cities of Topeka and Emporia, Kansas, by Judge Jones in a suit against the Cities of Montgomery and Huntsville, Ala., and by Judge Meek in a suit against the City of Fort Worth, Texas, in all of which cases final decrees have been entered restraining the construction of street pavements infringing the claims of the Basic Patent, No. 727,505, under which the bitulithic pavement has been laid, the validity of which was finally adjudicated in the cases against the Cities of Owosso and Muskegon, reported in 166 Fed. Rep. 309, and confirmed by the Supreme Court of the United States May 24th, 1909.

A Machine for Washing Filter Sand.

The Stocker machine for washing concrete materials has an equally valuable use in cleaning the sand and gravel for filter beds. It is in successful use for that purpose in South Milwaukee, Wis. A full description of the operation of the machine will be found in the May number of MUNICIPAL ENGINEERING, p. 362. In brief, the sand or gravel is put in at one end of the revolving drum of the washer and is stirred up by the angle irons and steel strips, riveted on the inside, each of which forms a chute, serving at the same time as an elevator to carry the material to the upper side of the drum, whence it drops into the next chute to get another bath. As the water enters at the upper or discharge end of the drum each washing is in a cleaner water, until the sand is discharged clean into conveyor or bin. Ask the Stocker Concrete Material Washer Co., Highland, Ill., for full information about the uses and the economies of the machine.

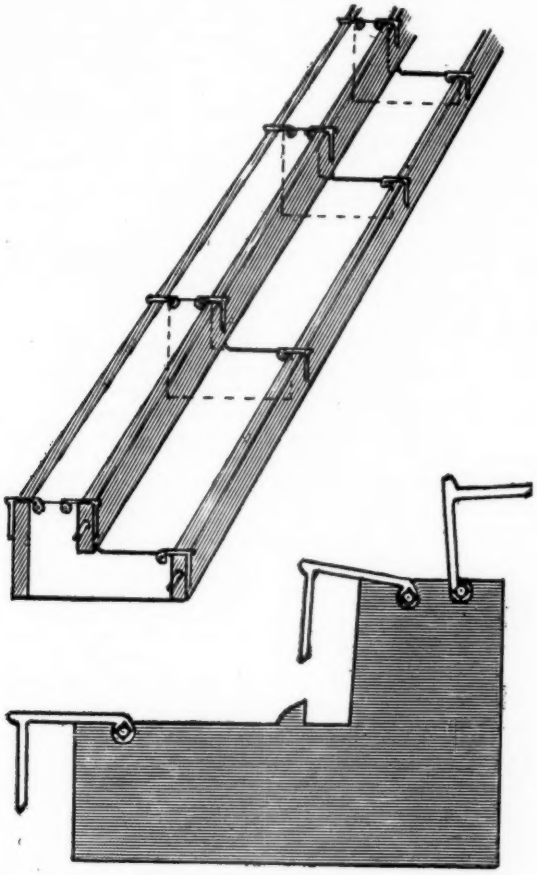
The Chicago Sewer Excavator.

The Chicago sewer excavator, made by the Municipal Engineering and Contracting Co., Railway Exchange, Chicago, Ill., has long been favorably known by contractors as one of the most efficient machines for digging trenches for sewers which has been devised. Its design covers all the points of difficulty with surprising completeness. It digs true to line and grade any material except solid rock, and size up to 5 feet wide and 27 feet deep. It digs sticky soils without

clogging, and permits sheeting of trenches in movable material close to the working face. It will remove any stone smaller than the trench and will pass over and dig around pipes that extend across the trench. It moves along the trench and from one job to another by its own power, and will travel over soft ground when equipped with its multipedal track device.

The company sells the machine outright or leases it on pay for work done by it.

The writer has seen the machine at work and confirms the claims of the makers as to its capabilities. Contractors and city officials should write to the company for full information.



SMITH'S PLATES AND CLAMPS FOR ARTIFICIAL CURB AND GUTTER.

Clamps for Concrete Curb and Gutter Forms.

The accompanying drawings show clearly the method of operation of the Smith patent rail clamps for concrete curb and gutter. The lower drawing of the two shows the division plate between sections of curb, with the clamps for holding in place the plank forms. The upper drawing shows four of these division plates in place with the planks for back of curb and gutter, front of curb and front of gutter, all in place and held there by the clamps. The solidity of the device, the convenience of its arrangement and the ease and certainty with which it can be operated can readily be seen. Stakes are done away with; a single man can withdraw the plates and finish the curb. Write to S. C. Smith & Son, Waverly, N. Y., for full statement of the excellencies and economies of the apparatus.

Supplying Individual Demands for Asphaltoilene.

The Good Roads Improvement Co., of Cincinnat,1 has devised a special equipment for applying asphaltoilene to roadways by the barrel, to meet the requests for oil in small amounts to be used by private individuals, clubs, improvement

associations and the like for the treatment of comparatively small areas.

The equipment consists of a special double-acting oil force pump set over the bung of the barrel of asphaltoilene, a 2-foot section of 1½-inch suction pipe, 25 feet of special oil-proof hose, end capped with brass couplings, an adjustable brass oil sprayer, a skid or frame with adjustable clamps, equipped with wrought iron hooks, to fit any size of barrel. The sprayer is specially adapted to use with asphaltoilene. A man at the pump and one with the sprayer can oil from 2,100 to 2,800 square yards of roadway in a day.

A neighborhood can club together, rent an outfit, buy enough oil, and hire a couple of laborers, and thus get rid of the dust nuisance next to them, and, since the makers claim that a single application asphaltoilene will settle the dust for a year, the trouble is soon over and the expense is light, less than sprinkling with water and more continuous in its effect. The company will give full information on request to its Cincinnati office in the First National Bank Building.

The Manual of Statistics.

The 1910 edition of *The Manual of Statistics* has just appeared, being the thirty-second annual issue of that standard publication. Changes of great interest and importance have taken place during the past year in corporate affairs in the United States and Canada, as well as in the capital and obligations of different railroad and industrial organizations. The 1086 pages of this handsome and compact volume present a greater fund of information for the use of investors and speculators than can be obtained in any other work of the kind. At the same time it covers ample information regarding government securities, mining stocks and the grain and cotton statistics. Its utility is further enhanced by an arrangement rendering references to the different sections easy and satisfactory. The edition also devotes much attention to the newer railroad or industrial companies, and gives the many changes in dividend payments which have occurred down to date of its issue. It presents throughout evidence of accuracy and careful compilation, and is brought down to date in its descriptive and statistical details, making the volume one which investors and all who are interested in the financial and other markets of the country cannot afford to be without. It is published by The Manual of Statistics Company, 20 Vesey Street, New York. Price, $5.00.

Trade Publications.

The Steel Protected Concrete Co., Real Estate Trust Bldg., Philadelphia, Pa., is distributing a handsome black and gold desk ruler as an advertiser of the Wainwright galvanized steel corner bar for protecting the edges of concrete curbs, steps, columns, etc.

The Edison Aggregate for May is mainly devoted to garages, and so is Bulletin No. 73 of the Universal Portland Cement Co., of Chicago.

An illustrated booklet of interest to city officials has been received from The Firestone Tire & Rubber Co. describing their dual pneumatic tire demountable rim equipment for use on automobile fire engines, ambulances, patrol wagons, etc. The Firestone company recommend this equipment as the most effective means of preventing tire delays in reaching fires and making other quick runs. Copies of the booklet will be mailed upon request.

J. A. & W. Bird & Co., Boston, issue a pamphlet on the waterproofing of structures with special reference to sub-level construction, the envelope method and the application of "tunaloid."

Two recent booklets of the Northwestern Expanded Metal Co. give designing data and describe the construction of highway bridges.

Catalog No. 6 of the Keystone Driller Co., Beaver Falls, Pa., is devoted to the Downie deep-well pumps, of which this company now supplies a full line of double and single geared and steam pumps, double stroke windmill pumps and combined pumps.

S. C. Smith & Son, Waverly, N. Y., describe in a brief and clear circular their patent rail clamps and division plates for sidewalk, curb and gutter forms and add a price list of the various sizes, which is of much interest to the sidewalk contractor.

The June publication of the Indianapolis office of the Lehigh Portland Cement Co., is filled with demonstrations of the value of cement and concrete drain and sewer tile.

The Osborn Engineering Co., Osborn Building, Cleveland, O., issue a handsome large book illustrating the many manufacturing and power plants, bridges and buildings which they have designed and constructed.

Reinforced concrete for houses is the subject of a recent pamphlet of the Vulcanite Portland Cement Co.

Geo. H. Holzbog & Bro., Jeffersonville, Ind., successors to the U. S. Sanitary Co., issue a handsome new catalog of their odorless steel vehicles for garbage, night soil, ashes, etc.

The Carb-Ox Co., Rogers Park, Chicago, Ill., send a catalog of their complete line of gas analysis instruments and allied specialties.

Buffalo-Pitts steam rollers are fully shown in a series of handsome circulars and catalogs of the Buffalo Steam Roller Co., Buffalo, N. Y.

Modern centrifugal pumps are the subject of a recent catalog of R. D. Wood & Co.

Forty-one reasons why concrete should be selected to the exclusion of any other type of construction are clearly given by DeWitt V. Moore, C. E., in a recent bulletin of the Lehigh Portland Cement Company.

The Thomas Moulding Co., Chicago, Ill., issues a booklet on "Artistic Brick and the Textile Principle in Brick Work," which is so artistic that it makes the reader feel sure that the brick it is intended to exploit will produce equally artistic results in the structures in which it is used. It is supplemented by a series of blotters of similar design.

Trade Notes.

ASPHALT.

Spokane, Wash.—This city has a new asphalt plant. Its capacity is 1,400 sq. yds. of asphalt daily, and it cost the city $14,490.

BRICK.

Galesburg, Ill.—The Purington Brick Co. has opened a second brick yard.

Mechanicsville, N. Y.—The Ferris Paving Brick Co. has changed its name to the Mechanicsville S. S. Brick Co.

CEMENT.

Cleveland, O.—The Gulf States Portland Cement Co. has been incorporated by W. B. Whiting, T. M. Kirby, J. Walworth Sutphin, Sterling Newell and C. C. Owens.

Sault Ste. Marie, Mich.—Surveys for a site for the Great Lakes Portland Cement Co. which will build a cement plant here, will begin soon.

St. Louis, Mo.—The McCormick Waterproof Portland Cement Co. has been incorporated by Theresa K. McCormick, William J. Brennan, Chauncey Vennewitz and J. P. McDonough.

Port Washington, N. Y.—The Magnesia Cement Co. has been incorporated by Harry R. H. Nichols, Frank Poggenburg, William H. Russell, Frank Collins and Charles Jackson, of New York City.

Gilmore City, Ia.—A company is being organized to construct a cement plant, with a capacity of 5,000 barrels a day.

CONCRETE BLOCKS.

Chickasha, Okla.—The Chickasha Cement Burial Co. has been organized by J. A. Rose, F. M. Frey, E. S. Dugan.

Waterloo, Ia.—The Cement Products Co. has been organized, with H. S. Raymond as president; Howard A. Sharp, vice-president; Ernest E. Schenk, secretary; W. H. Stewart, treasurer.

Plainfield, Ia.—J. J. Hullman is considering the question of installing a cement plant here.

Toronto, S. D.—Lauris & Peter Larson and Gus Anderson have established a plant for the manufacture of cement goods, using a thresher engine for power.

Fox Lake, Wis.—J. C. Williams and John Rogers have opened a cement block plant.

Neenah, Wis.—R. O. Sindahl is introducing the construction of block cement sidewalks here.

Lewiston, Idaho.—The Lewiston Glazed Pipe Co. has been organized recently to manufacuture cement pipe for irrigation purposes.

Biggsville, Ill.—The Biggsville Cement & Block Works will have a capacity of 12,000 cement brick per day. James Kilgore is at the head of the company.

Brooklyn, N. Y.—The Home Concrete Block Co. has been incorporated by Harrison Rockefeller, 332 Lenox Road, and Hans Skomfoe, 1684 Nostrand Ave., of Brooklyn, and Justin W. Smith, 60 Wall St., New York City.

Chicago, Ill.—The Lock Bar Steel Concrete Co. has been incorporated by C. F. Rathburn, R. M. Ashcraft, and E. M. Ashcraft, Jr., all of this city.

Brooklyn, N. Y.—The Greenpoint Cement Works Co. has been incorporated by Francisco Franzese, 43 Havermeyer st.; Amillo Franzese, 67 N. 6th st.; Francisco Pasuci, 309 N. 7th St.

Le Roy, Minn.—The Le Roy Cement Culvert Co. has been organized to push the sale of a culvert built in sections, invented by Gilbert Mahoney and Frank A. Rounds.

Milbank, S. D.—The Milbank Cement Construction Co. contemplates beginning the manufacture of cement tile, cement fence posts, building blocks, etc., about July 1.

Watertown, S. D.—H. A. Witzel will engage in the manufacture of hollow blocks with W. B. Vaughn, at Beach, N. D.

Olympia, Wash.—Sylvester & Gliddin have established a concrete building block plant at Sunnyside, Wash.

PURCHASE OF MACHINERY.

New York City.—(Special).—The Municipal Engineering & Contracting Company, manufacturers of trenching machines, have removed their offices in this city to 30 Church St.

Sacramento, Cal.—(Special).—Jenkins & Wells, 3530 Y st., desires to purchase a steam pile hammer.

Stuttgart, Ark.—(Special).—The Kress Construction Co. advises us that it desires to purchase cement machinery.

Denison, Tex.—(Special).—Roy M. Finley, secretary Denison Live Wires, contemplates the purchase of a complete set of street cleaning apparatus, sweepers, sprinklers, etc., and will appreciate catalogues and other data. The organization also desires data regarding vacuum street cleaners.

East Aurora, N. Y.—(Special).—A. Brotherhood, vil. prest., desires information regarding apparatus for pumping out cess-pools.

Portland, Ore.—(Special).—The Public Works Engineering Co., Beck Bldg., advises us that it is in the market for about 75,000,000 fire brick; roof tiling; 2 sets wagon scales; 2 recorders; temperature testing apparatus; 1 150 ft. chimney; 2 150-h. p. water tube boilers; 4 blower fans; 4 engines; steel dumping cars for incinerator, at Vancouver, B. C.

PURCHASE OF MATERIALS.

El Dorado, Kan.—(Special).—C. W. Buskirk advises us that he desires to purchase reinforcing materials.

MISCELLANEOUS.

Texarkana, Texas.—The plant of the International Lumber & Creosoting Co. was destroyed by fire, June 1, three weeks after its completion, entiling a loss of $600,000 to $900,000. The fire was caused by an explosion of gas in a tank containing 45,000 gals. of creosote.

Lafayette, Ind.—The Wabash Gravel Co. has been incorporated by L. R. Bissel, A. McQueen and G. R. Thompson.

Greenfield, O.—The San Mixing Machine Co. has been incorporated by V. E. Minick, E. L. McClain, F. B. James, Fay Baldwin and Charles Maiur.

Chicago, Ill.—The Kelly-Atkinson Construction Co., a bridge building firm with

offices at 188 Madison st., has purchased 2½ acres of land at Rondout, Ill., and will locate its plant and a large warehouse there.

New York, N. Y.—The Hayden Machinery & Supply Company, New York, has just moved into suite 53 Hudson Terminal Building, where the company will have larger quarters to facilitate the handling of its rapidly increasing business.

Mr. George B. Foster has been appointed Chicago Sales Manager for the Wisconsin Engine Co., with offices in the Fisher Building.

The Birch Company, Inc., engineers, with offices in Salt Lake City, Utah, Bozeman, Mont. and Fargo, No. Dak., have engaged the services of Mr. John Duden, Assoc. M. Am. Soc. C. E., four years, assistant city engineer, Salt Lake City, to act as chief engineer on hydraulic and irrigation projects. The company's practice will cover municipal, water supply, hydraulic and irrigation projects. General office is in the Felt Building, Salt Lake City.

SEWER PIPE.

Dennison, O.—The Dennison Sewer Pipe Co. has been incorporated by Theodore Lanning, W. L. Birney, Maurice Moody, Jas. J. Mazurie, W. K. Eckfeld, P. R. Rosing, and E. F. Utterback. The company will manufacture sewer pipe.

Patents Concerning Mixers and Conveyors for Concrete and Concrete Materials.

857,742. Measuring and Mixing Machine. Andrew Lanquist, Chicago, Ill.

858,017. Machine for Mixing Concrete. Geo. M. Pence, Topeka, Ind.

860,031. Concrete Mixer. Walter L. Jones, Stevenville, Mich.

862,848. Concrete Mixing Machine. Leonard C. Roberts, Samuel G. McTarnaghan and Wm. H. Jeffs, Nunda, N. Y.

863,775. Concrete Mixer. Frank W. Blakeslee, Ashtabula, O.

864,886. Machine for Mixing Materials for Concrete. Wm. H. Peters, Columbus, O.

864,449, 864,450, 864,451. Conveying and Mixing Machines. Lewis K. Davis, New York, N. Y.

865,150. Mortar Mixer or Hoe. Niels Anderson, Philadelphia, Pa.

865,365. Mixing Apparatus. Chester T. Drake, Chicago, Ill.

866,056. Concrete Mixer. Allen R. Parker, Akron, O.

868,762. Process of Manufacturing Concrete. Wm. D. Crow, E. Orange, N. J.

869,522. Machine for Mixing Concrete. Geo. D. Scheiffler, Jackson, Mich.

870,797. Concrete Mixer. Arthur W. Ransome, New York, N. Y.

871,363. Concrete Mixing and Molding Apparatus. Charles R. Schmidt, Baltimore, Md.

872,610. Mixing Machine. Roy N. Cunningham and John W. McPherson, Columbus, O.

872,729. Mixing Machine. Geo. Hiller, Teplitz, Austria-Hungary.

873,455. Mortar Mixer. Curt E. Oelman, Detroit, Mich.

876,270. Concrete Mixer. R. B. Fulton, Red Cloud, Neb.

876,466. Method of Preparing and Storing Concrete. Juergen H. Magens, Hamburg, Germany.

877,918. Cement Mixing Machine. Franklin J. Emal, Pickrell, Neb.

879,808. Concrete Mixer. Herman Besser, Alpena, Mich.

881,236. Concrete Mixer. Frederick B. Gulgow, Flandreau, S. D.

882,830. Concrete Mixer. John D. Luttrell, Benton Harbor, Mich.

883,498. Machine for Mixing Concrete and the Like. Thos. L. Smith, Milwaukee, Wis.

883,983. Concrete Mixing Machine. Ralph T. Solitt, Chicago, Ill.

884,667. Concrete Mixer. Philip A. Koehring, Milwaukee, Wis.

884,698. Apparatus for Mixing Concrete. John F. D. Withrow, Ottawa, Ont.

885,448. Unloading Apparatus for Concrete Mixers. Harold Davis, Washington, D. C.

886,018. Concrete Mixing Machine. Robert J. Selentine, Cleveland, O.

886,434. Concrete Mixer. John H. Stewart, Waterloo, Iowa.

886,680. Concrete Mixer. Jas. F. Crowe, Burnside, Ky.

886,768. Concrete Mixer. Progore P. De Bogory, Larkin, Fla.

887,854. Concrete Mixer. Arthur E. Schenck, Bethany, O.

888,118. Cement Mixer. Albert J. Remley, Crawfordsville, Ind.

888,198, 888,199. Concrete Mixer. Geo. J. Stafford, McGraw, N. Y.

888,975. Concrete Mixing Apparatus. Chas. B. Dunn, Almond, Ala.

890,086. Rotary Mixer for Concrete. Paul Olson, Stoughton, Wis.

890,641. Concrete Mixing Apparatus. Peter C. Hains, Sr., Washington, D. C.

891,345. Concrete Mixer. Samuel Knisley, Phillipsbury, Kan.

891,756. Concrete Mixer. Geo. P. White, Wallace, Idaho.

892,239. Concrete Mixer. John Fish, South Bend, Ind.

892,399. Concrete Mixer. John Carlen, Havana, N. Y.

892,496. Concrete Mixing Apparatus. Alfred G. Alexson, Orleans, Neb.

892,630. Concrete Mixer and Conveyor. John B. Thies, Dayton, O.

894,749. Apparatus for Mixing Concrete. Alfred von Siller, Washington, D. C.

894,813. Concrete Conveyor. Josiah W. Buzzell, E. Orange, N. J., and Wm. H. Larkin, Jr., Worcester, Mass.

895,651. Concrete Mixer. Chas. C. Lorenz, Denver, Col.

896,616. Concrete Spreader. James E. Briggs, Waterloo, Iowa.

897,313. Mixing Machine. Wm. O. Stark, Chicago, Ill.

898,171. Mixing Machine. Chas. E. Bathrick, Chicago, Ill.

898,958. Concrete Mixer. Theo. H. Bolte, Kearney, Neb.

899,071. Cement or Concrete Mixer. James A. Randall, Detroit, Mich.

899,414, 899,415. Concrete Mixer and Drum. Philip A. Koehring, Milwaukee, Wis.

899,547. Concrete Mixer. Norman E. Marsh, Des Moines, Ia.

901,024. Concrete Mixer. Jas. E. McKeon, Wilkes-Barre, Pa.

901,340. Concrete Mixer. Anson R. Hannaford, Traverse City, Mich.

903,426. Concrete Mixer. Wm. Wolter, Burress and Herman H. Stottko, Fairmont, Neb.

903,516. Mixing Machine (Concrete). Wm. O. Stark, Chicago, Ill.

905,092. Mixer. Archibald E. McNitt, Chicago, Ill.

905,375. Mixing Apparatus. James C. Shreffler, Chicago, Ill.

906,282. Mixing Machine. Wm. S. Plummer, St. Louis, Mo.

906,908. Mixer. Abner M. Monday, Knoxville, Tenn.
907,284. Concrete Mixer. Evan B. Ravencroft, Mishawaka, Ind.
907,297. Mixing Machine. Frank A. Sicklesteel, North Branch, Mich.
908,120. Concrete Mixer. Alexander D. Ney, Aurora, Ill.
909,134. Combined Mixer and Sprinkler for Making Roads. Bennett N. Beard, Shelton, Conn.
912,125. Concrete Mixer. Walter E. Hassam, Worcester, Mass.
913,425. Cement Mixer. Alfred G. Olsen, Elkhorn, Wis.
914,291. Portable Concrete Mixer. Boudinot G. Leake, Ft. Worth, Tex.
915,703. Elevator for Beton Mixing Machines. Albert Schwyzer, Balsthal, Switzerland.
920,415. Mixer Feed Device. Chas. E. Bathrick, Chicago, Ill.
920,416. Concrete Mixer. Chas. E. Bathrick, Chicago, Ill.
920,958. Concrete Mixer. Daniel E. Jones, Detroit, Mich.
921,480. Concrete Mixer. David Stevens and Samuel L. Thomas, Minneola, Kan.
922,112. Mixing Machine. Robert Edmondson, Mt. Vernon, O.
922,724. Mortar Mixer. George D. Scheiffler, Jackson, Mich.
922,860. Concrete Mixer. Milon J. Demorest, Belding, Mich.
923,868. Concrete Mixer and Spreader. Peter J. Lyback, Chicago, Ill.
925,744. Mortar Mixer. Perry L. Blystone, Cambridge Springs, Pa.
926,171, 926,172. Measuring and Feed Mechanisms for Concrete Mixers. Lawrence W. Cargill, Columbus, O.
927,117. Concrete Mixer. Warren D., Everett S., John G. Clough, Quincy, Ill.

IMPROVEMENT AND CONTRACTING NEWS

PAVING.

CONTEMPLATED WORK.

Knoxville, Tenn.—The county road commission has appropriated $72,000 for the construction of pikes.

Sour Lake, Tex.—Voted to issue $35,000 bonds for the improvement of roads in road precinct No. 2.

Wharton, Tex.—The question of paving Milam st. is being considered.

Quincy, Ill.—Council has decided to contest granitoid sidewalks in the business district.

Union, Ore.—Council has passed an ordinance providing for 16 blks. of concrete walks.

Corydon, Ind.—The town board has authorized the construction of concrete sidewalks in certain streets.

St. Paul, Minn.—Paving is contemplated for Dayton ave.

Bicknell, Ind.—This city is planning to pave the streets.

Radford, Va.—Voted to issue $25,000 bonds for street improvements.

McPherson, Kas.—A petition is being circulated for paving Maple st.

Muscatine, Ia.—The establishment of a new paving district is proposed.

Caldwell, Idaho.—Will vote July 7 on the issue of paving and water bonds.

Chariton, Ia.—Final action will be taken July 14 on the proposed brick paving.

Bemidji, Minn.—Bonds have been voted for street improvements, including paving.

Plymouth, Ind.—The estimated cost of improving the Michigan road is $30,000.

Aberdeen, Wash.—The city council has passed an ordinance for grading Hume st.

Eldora, Ia.—City council contemplates paving 6 blocks of streets this year.

De Land, Ill.—Plans and estimates are being prepared for paving ⅝ miles of street.

Sioux Falls, S. D.—Plans have been prepared for paving 6th st. with Jasper blocks.

Bellevue, Pa.—A resolution has been passed for improving Brighton and W. Bellevue roads.

St. Petersburg, Fla.—Will vote July 19 on the issue of bonds for paving the street with brick.

Little Rock, Ark.—Plans are being formulated for resurfacing Center st. from 12th to 18th sts.

Spokane, Wash.—Plans have been completed for 471,913 sq. ft. of concrete paving in 2nd ave.

Chehalis, Wash.—The construction of a concrete road between Chehalis and Centralia is contemplated.

Mexia, Tex.—The construction of about 100 miles of macadamized roads in this vicinity is proposed.

Hutchinson, Kas.—A resolution has been adopted providing for 1½ miles of street and alley paving.

Wharton, Tex.—Shell paving is contemplated for Milam st. from the Court House to the Southern Pacific depot.

Parsons, Kan.—An ordinance has been passed providing for the paving of 21st st. between Morgan and Briggs aves.

Hoquiam, Wash.—A resolution has been passed for clearing Sumner ave. and covering it with rock and gravel.

New Westminster, B. C.—This city will vote July 14 on the issue of $324,500 bonds for street improvements.

South Pasadena, Cal.—Bids will be asked for soon for grading and curbing and constructing cement gutters in Palen ave.

Groesbeck, Tex.—This county will vote July 9 on the issue of bonds for constructing 50 mls. or more of macadam roads.

Jonesboro, Ark.—The paving commission has decided to pave the business

streets in district No. 4 with Pittsburg blocks.

Houston, Tex.—Petitions are being circulated for paving a number of streets in the 5th ward with shell.

Ft. Wayne, Ind.—City engineer Randall is preparing uniform plans for cement sidewalks between the railroads in Calhoun st.

Cedar Rapids, Ia.—A resolution has been passed to pave Grand ave. with brick block on concrete base. L. J. Story, cy. clk.

Duluth, Minn.—The board of public works contemplates the construction of concrete walks in 5th ave. through the wholesale district.

Philadelphia, Pa.—Preliminary plans for a boulevard to Roxborough have been prepared by Chief Webster of the Bureau of Survey.

Omaha, Neb.—The question of paving the downtown district with asphalt, instead of brick, is being discussed. Cy. engr. Craig.

Portland, Ore.—Plans are being prepared for paving Kenton district, about 8 blocks of hard pavement, with 12-ft. sidewalks.

Shiner, Tex.—An ordinance was passed June 8 for issuing $10,000 bonds for street improvements and extension of the water works system.

Osceola, Ia.—City council voted, June 13, to pave blocks of streets, aggregating 12,000 sq. yds. of paving and 41,000 ft. of curbing.

Atchison, Kan.—Resolutions have been passed for paving alley block 2, 8th, Riley and Hickory sts. with brick. S. K. McCrary, cy. engr.

Athens, O.—Ordinances have been adopted for improving Campbell and Stimpson aves. Brick or block paving is contemplated for State st.

Augusta, Ga.—This city has decided to construct about 7000 sq. yds. of vitrified brick paving in Ellis st. and Cotton alley. Mayor Barrett.

San Angelo, Tex.—City engineer Goodfellow has been directed to establish a grade line in the business section preparatory to paving Chadbourne st.

Richmond, Tex.—Road bonds for $150,000 have been approved for building a shell road from the Brazos river to the Harris county line below Missouri City.

Wenatchie, Wash.—The city council passed resolutions providing for the construction of sidewalks in Bolenbaugh & Engineers' addition, at a cost of $33,718.

Atlanta, Ga.—Cy. engr. Clayton has been directed to ask for bids for wood block paving in Marietta st. Tile or cement walks are also proposed for Marietta st.

Martin, Tex.—This city voted, June 7, to accept the new law passed by the last legislature authorizing towns to do street paving and make other improvements.

Los Angeles, Cal.—Mayor Alexander has signed an ordinance regulating the manner in which local railway companies shall pave and keep in repair their tracks on paved streets.

Montgomery, Ala.—Mayor Gaston Gunter signed ordinances June 15, providing for mineral rubber paving in Mobile st. and asphalt paving in Bibb and Monroe sts. W. F. Black, cy. clk.

Red Oak, Ia.—Special.—The bids submitted June 8 for 56,000 sq. yds. of bituminized macadam with curbing were rejected and the city clerk directed to ask for bids on 25,000 sq. yds. brick paving on concrete base and 17,000 ft. of curb. Theo. S. DeLay, engr. in charge, Creston, Ia.

Memphis, Tenn.—Bids will be asked for soon for paving Cooper, East, Anderson, Latan, Porter and S. Lauderdale sts., Waldran boulevard, Monroe and Chelsea aves. and Miller place with asphalt. Jefferson ave. will be paved with wood block and a number of other streets with tar macadam later.

CONTRACTS TO BE LET.

Quincy, Cal.—Bids are asked until July 8 for constructing a road. Co. clk.

Red Cloud, Neb.—Bids are asked until July 7 for constructing 13 street crossings.

Paoli, Ind.—Bids are asked until July 5 for constructing roads. U. B. Ham, co. audt.

Seward, Neb.—Bids are asked until July 6 for brick block paving. Mel Gordon, cy. clk.

Salem, Ind.—Bids are asked until July 5 for constructing roads. Sam G. Ellis, co. audt.

Columbus, Ind.—Bids are asked until July 8 for constructing gravel roads. John M. Davis, co. audt.

Richmond, Ind.—Bids are asked until July 8 for constructing a macadam road. D. S. Coe, co. audt.

Grand Junction, Colo.—Bids are asked until July 5 for constructing a county road. Bd. co. comrs.

Marion, Ind.—Bids are asked until July 8 for constructing a road. A. Y. Stout, co. audt.

Minneapolis, Minn.—Bids are asked until July 5 for repairing road No. 7. Hugh R. Scott, co. audt.

Lebanon, Ind.—Bids are asked until July 8 for constructing gravel roads. B. F. Herdrich, co. audt.

Decatur, Ind.—Bids are asked until July 6 for constructing a macadam road. H. S. Michand, co. audt.

Sullivan, Ind.—Bids are asked until July 5 for constructing a gravel road. Ben C. Crowder, co. audt.

Winamac, Ind.—Bids are asked until July 5 for constructing 2 roads. Ellis S. Rees, co. audt.

Tipton, Ind.—Bids are asked until July 5 for constructing gravel roads. J. F. Barlow, co. audt.

Kentland, Ind.—Bids are asked until July 5 for constructing gravel roads. Elmer R. Brigham, co. audt.

Bloomington, Ind.—Bids are asked until July 6 for constructing a highway. Horace Blakely, co. audt.

Newport, Ind.—Bids are asked until July 11 for constructing a gravel road. H. T. Payne, co. audt.

Frankfort, Ind.—Bids are asked until July 9 for constructing gravel roads. Chas. F. Cromwell, co. audt.

Concord, N. H.—Bids are asked until July 8 for constructing trap rock roads. H. C. Hill, State engr.

Muncie, Ind.—Bids are asked until July 6 for improving a public highway. Jos. E. Davis, co. audt.

Fairmont, Minn.—Bids are asked until July 12 for constructing gravel roads. H. P. Edwards, co. audt.

Versailles, Ind.—Bids are asked until July 5 for constructing macadam roads. Nicholas Volz, co. audt.

Greencastle, Ind.—Bids are asked until July 5 for constructing 4 macadam roads. D. V. Moffett, co. audt.

Princeton, Ind.—Bids are asked until July 6 for improving 13 public highways. Wm. T. Roberts, co. audt.

Schuylkill Haven, Pa.—Bids are asked until July 5 for paving streets with vitrified brick. Geo. W. Butz, engr.

Vernon, Ind.—Bids are asked until

Ft. Slocum (New Rochelle, P. O.), N. Y.—Bids are asked until July 12 for constructing roads, sidewalks, curbs, gutters and drains. Constr. Q. M.

Indianapolis, Ind.—Bids are asked until July 6 for paving 36th st. from Pennsylvania st. to Central ave. with bitumass. C. A. Schrader, prest. B. P. W.

Santa Barbara, Cal.—Bids are asked until July 5 for the construction and extension of Mountain Drive in Dist. No. 2. C. A. Hunt, clk. co. bd. supvrs.

Lake City, Fla.—Bids are asked until July 12 for constructing 16,000 sq. yds. of vitrified brick paving and 5 mls. of cement walks. J. W. Layne, secy. B. P. W.

Charleston, S. C.—Bids are asked until July 8 for gravel paving at the Navy Yard. R. C. Hollyday, chm. bureau of yds. and docks, Navy Dept., Washington, D. C.

Crawfordsville, Ind.—Bids are asked until July 4 for grading, graveling and constructing cement curb and gutters and cement sidewalks in Mills Place. Fred B. Robinson, cy. clk.

Broad Ripple, Ind.—Bids are asked until July 5 for constructing concrete sidewalks in Broadway ave. and 61st st. Dr. Geo. Hesler, prest. town bd.; Fletcher Johnson, clk. town.

Verona, N. J.—Bids are asked until July 11 for grading and paving Pleasant Valley Way with bituminous telford, from this borough to West Orange, a distance of 4 mls. Wallace Oughether, dir. freeholders, 312 Court House, Newark, N. J.

Glen Gardner, N. J.—Bids are asked until July 7 for constructing 1 mi. of macadam road on the State lands adjoining the N. J. Sanatorium for Tuberculous Diseases.

Indianapolis, Ind.—Bids are asked until July 5 for grading and graveling and constructing cement walks on lot surrounding 2 school buildings. J. E. Cleland, bus. dir. bd. school comrs.

Woodruff Place, Ind.—Bids are asked until 8 p. m., July 2, for resurfacing the East, Middle and West Drives with wood block, asphalt, bitulithic, bitu-mass and bitu-mineral. Frank Goheen, town clk.

Hoosick Falls, N. Y.—Bids are asked until July 8 for 900 sq. yds. brick paving; 2700 sq. yds. bituminous macadam; 68,200 sq. ft. concrete sidewalks; 5600 sq. ft. driveways; 4660 lin. ft. concrete curb and gutter; relaying 7500 sq. ft. flag sidewalk; July 8. W. Thomas Wooley, vil. engr.

Glasgow, Ky.—Bids are asked until July 12 for constructing 7250 sq. yds. of bituminous macadam paving, and 7,250 sq. yds. of water-bound macadam pavement; 2400 or 4800 ft. 18-in. concrete gutters; 1850 cu. yds. earth excavation and refilling; building culverts and laying drain tile. Paul Greer, cy. clk.

Galveston, Tex.—Bids are asked until July 5 for constructing 4,000 sq. yds. of sidewalks, 2,200 ft. concrete curbing and 2,350 ft. concrete retaining curb. John M. Murch, co. audt.

Louisville, Ky.—Bids are asked until July 7 for 17 blocks of paving. Bd. public safety.

Wooster, O.—Bids are asked until July 5 for paving Quincy ave. H. F. Crowl, clk. B. P. S.

Elizabeth City, Va.—Bids are asked until July 5 for paving the street. St. paving com.

Oklahoma City, Okla.—Bids are asked until July 5 for paving 31st, 32nd, 33rd, Hill Eubank and 35th sts. with petrolithic. Bon Panman, cy. clk.

Columbus, O.—Bids are asked until July 5 for constructing 21.6 mis. of pike road. T. L. Thomas, co. audt.

Evansville, Ind.—Bids are asked until July 19 for resurfacing 4th and Division sts. Harry Stinson, co. audt.

Port Byron, Ill.—Bids are asked until July 5 for constructing 1750 ft. cement sidewalk. B. B. Huntley, vil. clk.

Vincennes, Ind.—Bids are asked until July 5 for constructing gravel roads. T. Scott, co. audt.

Rushville, Ind.—Bids are asked until July 5 for constructing a macadam road. Jesse M. Stone, co. audt.

Lafayette, Ind.—Bids are asked until July 7 for constructing a gravel road. John P. Foresman, co. audt.

Canton, O.—Bids are asked until July 6 for 1 mi. of brick paving in Lexington twp. J. H. McConnell, co. audt.

Wausau, Wis.—Bids are asked until July 15 for 8000 sq. yds. of creosoted block paving. B. C. Gowen, cy. engr.

Burlington, N. J.—Bids are asked until July 5 for constructing a gravel road. Geo. A. McCoy, chm. road com.

Delphi, Ind.—Bids are asked until July 5 for improving highways in Deercreek and Jackson twps. M. G. Haun, co. audt.

Cincinnati, O.—Bids are asked until July 8 for widening road on Harris ave., Mt. Washington. Fred Dreihs, clk. co. comrs.

Mt. Holly, N. J.—Bids are asked until July 5 for constructing a gravel road. Harry E. Dubell, dir. bd. chosen freeholders.

Flemington, N. J.—Bids are asked until July 8 for constructing 17,802 ft. of macadam road. J. W. Sharp, dir. bd. chosen freeholders.

Washington, D. C.—Bids are asked until July 9 for paving streets and avenues with sheet asphalt and asphalt block. Dist. Comrs.

Port Byron, Ill.—Bids are asked until July 5 for constructing 1750 lin. ft. 4-ft. cement sidewalk. B. B. Huntley, vil. clk.

Cincinnati, O.—Bids are asked until July 5 for improving the Harrison and New Haven road. Stanley Struble, prest. co. comrs.

Anderson, Ind.—Bids are asked until July 7 for constructing 3 gravel and 1 asphalt road with asphalt binder. A. L. Smith, co. engr.

Brooklyn, N. Y.—Bids are asked until July 6 for paving and constructing sidewalks in various streets. Alfred E. Steers, prest. boro.

Crown Point, Ind.—Bids are asked until July 5 for constructing cement curbing in North st. Herman J. Lehman, clk. town bd. trustees.

Baltimore, Md.—Bids are asked until July 14 for constructing a section of State Aid highway. E. Stanton Bosley, secy. highway com.

Indianapolis, Ind.—Bids are asked until July 6 for constructing cement sidewalks in a number of streets. C. A. Schrader, chm. B. P. W.

Indianapolis, Ind.—Bids are asked until July 6 for constructing cement sidewalks in Grace and Ruckle sts. C. A. Schrader, chm. B. P. W.

Des Moines, Ia.—Bids are asked until July 6 for paving 35th st. with asphalt, requiring 4000 sq. yds. of paving. James R. Hanna, mayor.

Anderson, Ind.—Bids are asked until July 11 for constructing 4346 sq. ft. cement walk and 1000 lin. ft. curb and gutter. G. A. Pampher, cy. engr.

Ft. Madison, Ia.—Sealed bids are asked until 7:30 p. m. July 2 for grading and curbing with cement concrete, 5th st. L. G. Kiel, cy. clk.

July 5 for constructing sidewalks in a large number of streets. H. S. Holton, dir. pub. service.

Davenport, Ia.—Bids are asked until July 5 for paving with asphalt, 17th, 18th and Iowa sts. A. M. Compton, chm. B. P. W.

David City, Neb.—Bids are asked until July 13 for constructing 20 or more cement crossings. F. S. Meyers, cy. clk.

Fullerton, N. D.—Bids are asked until July 11 for constructing 2 road grades. Fred R. Applequist, cy. audt.

Loup City, Neb.—Bids are asked until July 19 for cement crossings and sidewalks. Cy. clk.

Marinette, Wis.—Bids are asked until July 18 for paving 9th st. Cy. clk.

Seward, Neb.—Bids are asked until July 10 for paving, guttering and curbing in dist. No. 1. Mell Gordon, cy. clk.

Sleepy Eye, Minn.—Bids are asked until July 5 for cement crossings and gutters. H. C. Peterson, cy. recdr.

Hoosick Falls, N. Y.—Bids are asked until July 8 for constructing 68,200 sq. ft. concrete sidewalks; 5600 ft. concrete driveways; 4660 lin. ft. concrete curb and gutter; 7500 sq. ft. flags relaid; 90 sq. yds. vitrified brick paving; 2700 sq. yds. bitumen macadam. Sanford L. Cluett, secy. impvt. com.

Columbus, O.—Bids are asked until July 6 for grading and macadamizing 2.32 mis. of road in Richland Co.; until July 7 for grading and paving with brick 1.5 mi. of road in Columbiana Co.; until July 8 for grading and paving with brick 1.08 mi. of road in Wayne Co. Jas. C. Wonders, State highway comr.

Peoria, Ill.—Bids are asked until July 5 for paving an alley with vitrified brick, requiring the following: 600 cu. yds. exca.; 1840 lin. ft. curb; 1769 sq. yds. brick paving; 1769 sq. yds. sand cushion; 1769 sq. yds. sand filler; 1769 sq. yds. gravel foundation. Geo. F. Simmons, prest. bd. local impvts.

Waukesha, Wis.—Bids are asked until July 11 for paving White Rock ave., East Park ave., and Cook st. with tar macadam with combination concrete curb and gutter; Lincoln ave. and Center st. with brick on concrete base between the tracks of a double track railway and with tar macadam between tracks and gutters. Morgan R. Butler, cy. engr.

CONTRACTS AWARDED.

Galveston, Tex.—J. C. Kelso was awarded the contract for paving the boulevard.

Riverside, Cal.—The contract for improving Mulberry st. was awarded to the Johnson-Shea Co. for $9,370.

Cincinnati, O.—Edward Ryan secured the contract for improving Montgomery Pike with granite, for $43,720.

Dayton, O.—Sellers & Schmitthauer secured the contract for grading and graveling Reasor ave. for $4,031.

Mt. Gilead, O.—Brady, O'Connel & Malloy secured the contract for constructing the Westfield road, for $20,464.

Lansdowne, Pa.—The United Paving Co. of Atlantic City, N. J., was awarded a contract, June 3, for paving Baltimore ave., for $58,000, with bitulithic.

Lethbridge, Alta.—The Forest City Paving Co. was awarded a contract for 27,000 sq. yds. of cement paving.

Duluth, Minn.—P. McDonnell was awarded the contract for paving Garfield ave. with sandstone, for $99,000.

Washington, Ind.—The contract for constructing a gravel road was awarded to N. H. Wilson, for $2,647.50.

Rolla, Mo.—The contract for paving Pine st. was awarded to Likes Bros., of Springfield, at $2.34 a sq. yd.

Michigan City, Ind.—The contract for constructing a macadam road was awarded to W. B. Hutchinson, for $8,080.

Vernon, Ind.—The contract for constructing a pike road was awarded to J. M. Childers, of Grammer, Ind., for $3,093.

Billings, Mont.—James Kennedy, of Fargo, N. D., secured the contract for paving in this city, aggregating $200,000.

Lebanon, Ind.—The contract for constructing a gravel roadway was awarded to Geo. T. Miller, of this city, for $18,407.40.

Little Rock, Ark.—The Memphis Asphalt & Paving Co. was awarded the contract, June 14, for resurfacing Center st.

Cincinnati, O.—Ed Ryan was awarded the contract, June 11, for paving Elberon ave. with granite, for $184,208.50.

Beloit, Wis.—The contract for street paving was awarded to the Western Improvement Co., of Racine, for $66,767.48.

Maysville, Ky.—The contract for street improvements was awarded to Kelly Bros. of Portsmouth, O., for $19,000.

Winamac, Ind.—The contract for constructing a road was awarded to Jerry Anderson, of Medaryville, Ind., for $1,040.

Dallas, Tex.—Special.—The contract for 9,645 sq. yds. of bitulithic paving was awarded to the Texas Bitulithic Co.

Baltimore, Md.—Special.—The contract for 5600 sq. yds. of bitulithic paving was awarded to Warren Bros. Co., of Boston.

Whitesboro, N. Y.—Special.—The contract for 24,700 sq. yds. of bitulithic paving was awarded to Warren Bros. Co., of Boston.

New Bedford, Mass. — Special. — The contract for 13,900 sq. yds. of bitulithic paving was awarded to Warren Bros. Co., of Boston.

Jackson, Miss.—Special.—The contract for 12,000 sq. yds. of bitulithic paving was awarded to the Southern Bitulithic Co.

New Castle, Pa.—The contract for paving Elm st. was awarded, June 14, to the Woods & Golder Construction Co., for $3,252.10.

Brazil, Ind.—The contract for constructing a road was awarded to L. W. Gibben & Son, of Saline City, Ind., for $8,080.

Peoria, Ill.—J. W. Bushnell was awarded the contract, June 16, for resurfacing Bradley ave. with asphalt, for $12,110.50.

Nanaaimo, B. C.—The contract for constructing 8 mis. of concrete walks was awarded to W. H. Worswick, of Victoria, B. C.

New Westminster, B. C.—The contract for cement walks was awarded to the Pacific Contracting & Investment Co., for $13,297.

Albany, Ore. — Special. — The Warren Construction Co., of Portland, secured the contract for 22,275 sq. yds. of bitulithic paving.

Atlanta, Ga.—Special.—Warren Bros. Co., of Boston, Mass., secured the contract for 20,000 sq. yds. of bitulithic paving here.

Rome, N. Y.—Special.—The contract for 13,578 sq. yds. of bitulithic paving was awarded to Warren Bros. Co., of Boston, Mass.

Brantford, Ont.—Special.—The Warren Bituminous Paving Co., of Toronto, was awarded a contract for 3500 sq. yds. of paving here.

Virginia, Minn.—Special.—H. L. Bartlett, of this city, was awarded a contract for 26,000 sq. yds. of bitulithic paving here.

Waco, Tex.—Special.—The contract for 25,000 sq. yds. of bitulithic paving was awarded to the Texas Bitulithic Co., of Dallas.

Abilene, Tex.—Special.—The Texas Bitulithic Co., of Dallas, was awarded a contract for 20,000 sq. yds. of bitulithic paving here.

Ft. Worth, Tex.—Special.—The Texas Bitulithic Co., Dallas, secured the contract for 20,000 sq. yds. of bitulithic paving here.

Ft. Worth, Tex.——Special.—The contract for 26,200 sq. yds. of bitulithic paving was awarded to the Texas Bitulithic Co., of Dallas.

Harrison, N. J.—Special.—The J. F. Shanley Co., of this city, was awarded the contract for 6,554 sq. yds. of bitulithic paving.

Little Falls, N. Y.—Warren Bros. secured the contract for bitulithic paving with curbing in N. 2nd st., for $1519.60, June 17.

Indianapolis, Ind.—John Arnold secured the contract, June 15, for constructing cement walks in Gray st., at 16 cts. a sq. ft.

Benwood, W. Va.—The contract for 7000 ft. of curbing in the 4th and 5th wards was awarded to W. H. McClain, of Bellaire, O.

Creston, Ia.—Hailton & Schwartz, of Shenandoah, Ia., were awarded the contract, June 3, for curbing and asphaltic paving in Adams st.

Racine, Wis.—The contract for paving Carlisle ave. with asphalt was awarded to the White Construction Co., at $1.97 a sq. yd.

Peoria, Ill.—James S. Allen was awarded the contract for paving certain alleys, June 7, for $1911, and Bryan ave. for $10,108.42.

Prescott, Ariz.—The Johnson-Shea Co., of Riverside, Cal., was awarded the contract for constructing 13 mis. of road, for $24,000.

Elyria, O.—The contract for 7000 sq. yds. of asphalt block paving was awarded to the Andrews Asphalt Paving Co., of Hamilton, for $15,550.

Toronto, Ont.—Special.—The contract for 24,083 sq. yds. of bitulithic paving was awarded to the Warren Bituminous Paving Co., of this city.

Asheville, N. C.—Special.—The Atlantic Bitulithic Co., of Richmond, Va., was awarded the contract for 12,000 sq. yds. of bitulithic paving.

El Paso, Tex.—Special.—The Texas Bitulithic Co., of Dallas, was awarded the contract for 22,354 sq. yds. of bitulithic paving.

Springfield, Mass.—Special.—The Warren Bros. Co., of Boston, was awarded the contract for 3300 sq. yds. of bitulithic paving.

Peoria, Ill.—John W. Bushnell was awarded the contract for paving Barker ave. from Moss to Western ave., with asphalt, for $12,119.50.

Galveston, Tex.—The contract for paving Commercial ave. with crushed stone, with concrete curb and gutter, was awarded to Goulson & Davis.

Lansdowne, Pa.—Special.—A contract for 21,000 sq. yds. of bitulithic paving was awarded to the Standard Bitulithic Co., of New York City.

East Orange, N. J.—Special.—The Standard Bitulithic Co., of New York City, was awarded the contract for 23,800 sq. yds. of bitulithic paving.

Bartlesville, Okla.—Special.—The Kansas Bitulithic Co., of Kansas City, Mo., secured the contract for 8,000 sq. yds. of bitulithic paving here.

Wadesboro, N. C.—The contract for paving the streets and sidewalks was awarded to E. P. Lindsay, of Portsmouth, Va., for about $30,000.

Chicago, Ill.—The Barber Asphalt Paving Co. was awarded a contract, June 10, for asphalt street repairs, at 76 cts. a sq. yd. for resurfacing.

Dallas, Tex.—The Texas Bitulithic Co. was awarded contracts, June 13, for bitulithic paving in Reiger and Carroll aves., at $2.30 a sq. yd.

Robinson, Ill.—The contract for paving the public square with brick was awarded to Allan Parrish, of Paris, Ill., for about $11,000.

Elgin, Ill.—The McCarthy Improvement Co., of Davenport, Ia., was awarded the contract for paving Spring st. with mineral rubber, for $52,875.

Tacoma, Wash.—The Barber Asphalt Paving Co. was awarded the contract for paving S. I., S. 8th, S. 9th and S. 10th sts. with asphalt, for $50,264.

Delaware, O.—H. N. Oberlander, of Marion, O., secured the contract for improving 4.7525 mis. of grading, draining and macadamizing, for $24,845.

Shreveport, La.—The contract for constructing 40,000 sq. yds. of creosoted wood block paving was awarded to the Gulfport Creosoting Works, for $50,000.

Syracuse, N. Y.—F. J. Baker was awarded contracts, June 4, as follows: Asphalt paving with stone curb, Dewitt st., $6,679.90; Oxford st., $6,150.75.

Albert Lea, Minn.—Fielding & Shepley secured the contract, June 8, for paving Main st. with creosoted wood blocks, at $2.28 a sq. yd. or $28,324.44.

Little Rock, Ark.—The M. D. L. Cook Construction Co. was awarded a contract, June 6, for paving W. 6th st. with asphalt, at $1.87 a sq. yd., or $42,077.

Superior, Wis.—The contract for constructing several blocks of sidewalks in the East End was awarded to E. Hawarden, at 62 cts. a lin. ft.

Lexington, Ky.—The contract for paving Limestone st. with brick was awarded to Kelly Bros., of Portsmouth, O., at $1.85 a sq. yd., or about $20,000.

Mishawaka, Ind.—Special.—The contract for constructing 5,000 sq. yds. of bitulithic paving was awarded to the Western Construction Co., of Lafayette, Ind.

Minersville, Pa.—The contract for paving Sunbury st. with brick was awarded, June 2, to the McConnell & Fitzpatrick Co., of Pittston, at $2.19 a sq. yd.

Indianapolis, Ind.—The contract for constructing cement walks in Georgia st. from Noble to East, was awarded, June 8, to Marion Caldwell, at 14 cts. a sq. yd.

St. Louis, Mo.—Special.—The contract for constructing 3,251 sq. yds. of bitulithic paving was awarded to the Granite Bituminous Paving Co., of this city.

Southport, Ind.—The contract for constructing 3127 ft. of cement sidewalks was awarded to H. W. Thielking, of Indianapolis, at 43¾ cts. a lin. ft.

Bloomington, Ill.—The Andrews Asphalt Co., of Hamilton, O., was awarded the contract for paving W. Washington and S. Main sts. with asphalt, at $1.28 a sq. yd.

San Diego, Cal.—The Knight & Hyde Construction Co. was awarded a contract for constructing a 25-ft. disintegrated granite road at Ft. Rosecrans, for $25,151.

Shelbyville, Ind.—The contract for street improvements in the industrial and Ray additions was awarded to Meloy & Porter for $366,690.19 and $16,917.13 respectively.

Trenton, Mo.—The contract for paving

High and Water sts. and E. College ave. with brick was awarded to Gates & Holbrook, of Kansas City, Kan., for more than $37,000.

Grosse Pointe Farms, Mich.—Special.—The contract for constructing 27,750 sq. yds. of bitulithic paving was awarded to the Central Bitulithic Paving Co., of Manistee, Mich.

Denver, Colo.—The Pueblo Construction Co. was awarded the contract for grading, curbing and surfacing the streets in Arlington Park, including 33 blocks, for $80,805.

Creston, Ia.—Special.—The contract for constructing 2200 sq. ft. of 4-ft. cement walks was awarded, June 13, to Wm. Rutledge & Co., of this city, at 11½ cts. a lin. ft.

Bloomfield, Ind.—Contracts for constructing gravel roads have been awarded as follows: J. H. Blackwell, Jr., of Sandborn, Ind., $1,785; J. P. Wright & Co., of Bloomfield, $6,199.87.

Portland, Ore. — Special. — The Pacific Bridge Co., of this city, secured contracts for 24,338 sq. yds.; the Warren Construction Co., of this city, a contract for 59,686 sq. yds. of bitulithic paving.

Shreveport, La.—The Filbertine Paving Co. was awarded the contract for bitulithic paving, and the Hot Springs Co. the contract for wood block paving. The total cost of the contracts reaches $600,000.

Utica, N. Y.—The Barber Asphalt Paving Co. was awarded contracts for paving McQuade and Downer aves. with asphalt with stone curbing, June 4, as follows: Downer ave., $10,819.80; McQuade ave., $8,904.85.

York, Pa. — Paving contracts were awarded, June 17, as follows: S. George st., sheet asphalt, $1.78, and W. York ave., $1.69 a sq. yd., Filbert Paving Co.; E. Market st., asphalt, $1.67, Central Supply & Construction Co.

Virginia, Minn.—Paving contracts were awarded, June 7, as follows: Maple st. and Central ave., bitulithic, H. L. Bartlett Co., $2.50 a sq. yd.; avenue leading from Chestnut st., P. McDonnell, creosoted wood blocks, $2.62 a sq. yd.

Centerville, Ia.—The contract for brick paving was awarded to McGuire & Stanton, of Leavenworth, Kan., as follows: Brick paving, $2.03 a sq. yd.; grading, 30 cts. a cu. yd.; combined curb and gutter, 52 cts. a lin. ft.

York, Pa.—Special.—The Standard Bitulithic Co., of New York City, was awarded the contract for 14,466 sq. yds. of bitulithic paving, and the Juniata Paving Co., of this city, secured a contract for 4300 sq. yds. of bitulithic paving.

Montreal, Que.—Contracts were awarded, June 6, as follows: Asphalting sidewalks, Sicily Asphalt Co., $1.83 a sq. yd.; asphalt sidewalks, Bitulithic Paving Co., $1.83; furnishing 25,000 sq. yds. of New York bluestone, F. D. Lawrence.

Wichita, Kan.—The Newell & Drayer Construction Co. was awarded the contract, June 6, for paving, curbing and guttering 11 blocks of Emporia ave. with brick, at $1.81 a sq. yd.; 22½ cts. a ft. for curbing, and 32½ cts. a ft. for gutter.

Wabash, Ind.—The contract for constructing a gravel road on the line dividing Wabash, Huntington and Whitley counties, and on the line between Wabash and Huntington counties, was awarded to Wm. Reffert, of Monroeville, Ind., for $11,900 and $19,111 respectively.

Scranton, Pa.—The McDonaldson Construction Co. was awarded the contract for paving Hickory st. with asphalt and stone block, and W. Market st. with asphalt; Warner-Quinlan Co., of Syracuse, N. Y., Green Ridge st., asphalt; Wm. Brown Co., Webster ave., stone blocks.

Hickory, N. C.—The contract for constructing new streets and cement sidewalks was awarded to Hart, Abee & Co., of this city, for $55,498. Tarvia X will be used for improving the streets.

Springfield, O.—Paving contracts have been awarded as follows. Yellow Springs st., sheet asphalt with Bolin brick between car tracks, $61,043.40, and McCreight ave., $17,098.40, Peters Bros., of Chicago; Pleasant st., asphalt block, Toledo Asphalt Block Co., $10,321.50.

Marion, Ind.—L. C. Lillard was awarded a contract for constructing the Soldiers' Home boulevard, at $5.49 a lin. ft., and O. I. Simmons the contract for the 38th st. boulevard, for $36,970. The L. M. Cole stone road will be constructed by James Crosby Co., of Bluffton, for $7,167.

Detroit, Mich.—Contracts for paving various streets have been awarded as follows: Collins st., concrete, R. D. Baker Co., Home Bank Bldg., $33,993; Hart ave., cedar, T. E. Currie, 345 Penn. ave., $12,494; St. Paul ave., Sec. 2, cedar blocks, W. W. Hatch & Co., Hammond Bldg., $7,868; sec. 1, cedar blocks, $2,572.

Wabash, Ind.—Gravel road contracts have been awarded as follows: Lester road, Frank Reed, of Liberty Mills, $12,000.50; Badger extension, Landis & Wilson, of Marion, $2,000; Schults-Ryan road, Huffman & Addington, of Huntington, $10,640; Maumee road, C. J. McGreevey & Sons, $10,970; Thrush road, Huffman & Addington, $5,360.

Peru, Ind.—Contracts for constructing gravel roads were awarded, June 8, as follows: James M. Little, Indianapolis, Ind., $7,446; James F. Pierce, Delphi, Ind., $2,900; C. M. King, Tipton, Ind., $6,500 and $7,800; Ted McKinney & Co., Sheridan, Ind., $8,997.

Ft. Wayne, Ind.—The Barber Asphalt Paving Co. was awarded the contract, June 10, for paving John st. as follows: Asphalt paving, $1.68 a sq. yd.; brick paving between car tracks and 12 ins. outside, $2.20 a sq. yd.; excavation, 45 cts. a cu. yd.; curbing, 57½ cts. a lin. ft. Bids have been received for paving certain alleys and constructing cement sidewalks, but were not taken under advisement.

Bloomington, Ill. — Paving contracts were awarded, June 6, as follows: I. D. McLain, section of Main st., Danville brick, $1.84½ a sq. yd.; stone curbing, 60 cts. a lin. ft.; resetting stone curbing, 6 cts. a lin. ft.; c. i. crossing plates, $11 each. Andrews Asphalt Paving Co., section of Main st., asphalt, $1.28 a sq. yd.; curb wall plastering, 3 cts. a lin. ft.; Washington st., asphalt, $1.28; combined curb and gutter, 50 cts. a lin. ft.

Seattle, Wash.—Contracts were awarded, June 10, as follows: Market st., grading, Rowan & Anderson, $5,616; North Broadway, grading and concrete walks, N. D. Johnson, $17,878; Fourth ave., paving, to Holt & Jeffery, Hinckley Block, $86,447; 20th ave., S., asphalt paving, Independent Asphalt Paving Co., Seattle Theatre, $52,649; N. 46th st., concrete walks, Great Western Fuel Co., 2523 4th ave., $9,728.

Boise, Idaho.—Bids were submitted, May 28, for paving, as follows: Asphalt, (a) without guarantee, (b) with 5-year guarantee—Coast Contracting Co., 1718 Pacific st., Tacoma, Wash., (a) $324,708, (b) $346,894; P. J. McHugh, Third and Mercer sts., Seattle, Wash., (a) $327,892, (b) $327,892; Pacific Paving Co., Seattle,

Wash., (a) $301,761, (b) $316,552; Barber Asphalt Paving Co., Boise, (a) $302,600, (b) $317,391. Concrete—J. Gustoffson, Boise, $225,076; Coast Contracting Co., Tacoma, $227,159; P. J. McHugh, Seattle, $254,008. Granitoid, (a) without guarantee, (b) with 5-year guarantee, (c) with 10-year guarantee—R. S. Biome Co., 79 Dearborn st., Chicago, Ill., (a) $373,607, (b) $381,003, (c) $395,794. Bitulithic, (a) stone base without guarantee, (b) stone base with 5-year guarantee, (c) stone base with 10-year guarantee, (d) concrete base without guarantee, (e) concrete base with 5-year guarantee, (f) concrete base with 10-year guarantee—Warren Construction Co., Portland,Ore., (a) $350,392, (b) $360,746, (c) $375,537, (d) $365,183, (e) $375,537, (f) $390,328. No bids were received for brick paving. Karl Paine, prest. B. P. W.

Albany, N. Y.—Contracts for repaving and resurfacing State and county roads were awarded, June 6, as follows: Repair Contract No. 76, Loudon Road No. 119, Section 2, Albany County: T. F. Shaughnessey Co., Albany, N. Y., $24,400 (awarded contract on residuum).

Repair Contract No. 78, Delmar-Slingerland Road No. 92, Albany County: Alonzo Schaupp, Albany, N. Y., $10,789 (awarded contract on residuum).

Repair Contract No. 65, Olean-Allegany County Highway No. 601, Cattaraugus County: F. V. E. Bardol, Buffalo, N. Y., $6,500 (awarded contract on Bermudez).

Repair Contract No. 56, Owasco County Highway No. 383, Cayuga County: Brayer Bros., Auburn, N. Y., $10,341 (awarded contract on residuum).

Repair Contract No. 67, Moravia-Niles County Highway No. 591, Cayuga County: Brayer Bros., Auburn, N. Y., $17,907 (awarded contract on Bermudez).

Repair Contract No. 68, Green-Smithville Flats County Highway No. 218, Chanango County: Albert Gaffey, Syracuse, N. Y., $5,800 (awarded contract).

Repair Contract No. 55, Cuyler County Highway No. 40, Cortland County: Chambers & Grady, Rochester, N. Y., $2,808 (awarded contract on Bermudez).

Repair Contract No. 62, Orchard Park, County Highway No. 272, Section 5, Erie County: John E. Johnson, Buffalo, N. Y., $6,913 (awarded contract on residuum).

Repair Contract No. 63, Transit County Highway No. 89, Section 2, Erie County: All bids rejected.

Repair Contract No. 83, Gloversville-Mayfield County Highway No. 33, Fulton County: John E. Burns & Co., Boston, Mass., $37,964 (awarded contract on Bermudez).

Repair Contract No. 49, Redwood-Alexandria Bay County Highway No. 182, Jefferson County: J. P. Cunningham, Plattsburgh, N. Y., $1,164 (awarded contract on Bermudez).

Repair Contract No. 50, Watertown-Sacketts Harbor-Henderson County Highway No. 181, Jefferson County: J. P. Cunningham, Plattsburgh, N. Y., $21,960 (awarded contract on Bermudez).

Repair Contract No. 57, Hamilton County Highway No. 81, Section 2, Monroe County: Wood, Tompkins & Truesdale, Hilton, N. Y., $4,390 (awarded contract).

Repair Contract No. 58, Scottsville County Highway No. 79, Section 2, Monroe County: Niagara Construction Co., Corning, N. Y., $20,613 (awarded contract on residuum).

Repair Contract No. 59, Clifton County Highway No. 78, Section 1, Monroe County: Wood, Tompkins & Truesdale, Fulton, N. Y., $4,390 (awarded contract).

Repair Contract No. 60, Scottsville County Highway No. 63, Section 1, Monroe County, Whitmore, Rauber & Vicinus, Rochester, N. Y., $11,945 (awarded contract).

Repair Contract No. 61, Ridge County Highway No. 6, Section 1, Monroe County: Wood, Tompkins & Truesdale, Fulton, N. Y., $7,785 (awarded contract on residuum).

Repair Contract No. 75, West Mohawk River County Highway No. 108, Montgomery County: Alonzo Schaupp, Albany, N. Y., $9,700 (awarded contract on residuum).

Repair Contract No. 85, Amsterdam-Minaville County Highway No. 32, Section 1, Montgomery County: John E. Burns & Co., Boston, Mass., $10,673 (awarded contract on Bermudez).

Repair Contract No. 48, Deerfield County Highway No. 3, Oneida County: Utica-Paris, County Highway No. 71, Oneida County: Aetna Engineering & Construction Co., Herkimer, N. Y., $41,400 (awarded contract on Bermudez).

Repair Contract No. 52, Fabius-Apulia County Highways Nos. 49, 75, 121, Sections 1, 2 and 3, Onondaga County: Joseph H. Conners & Co., Fulton, N. Y., $15,940 (awarded contract).

Repair Contract No. 53, West Lake County Highway No. 48, Marcellus-Marietta County Highway No. 74, Onondaga County: C. T. Hookway, Syracuse, N. Y., $10,360 (awarded contract on Bermudez).

Repair Contract No. 51, Gorham-Stanley County Highway No. 203, Naples-Atlanta County Highway No. 204; Naples-Woodville County Highway No. 205, Ontario County: C. Aikenhead Co., Rochester, N. Y., $14,258.68 (awarded contract on residuum).

Repair Contract No. 54, Honeoye-Hemlock County Highway No. 191, Ontario County: Albert Gaffey, Syracuse, N. Y., $6,660 (awarded contract).

Repair Contract No. 86, Gilbertville-Mt. Upton County Highway No. 314, Otsego County: Spuyten Duyvil Construction Co., New York, $15,080 (awarded contract).

Repair Contract No. 80, Albia-Wynantskill County Highway No. 77, Rensselaer County. All bids held.

Repair Contract No. 84, Troy-Brunswick County Highways Nos. 10, 25, Sections 1 and 2, Rensselaer County: County Construction Co., Troy, N. Y., $15,381 (awarded contract on residuum).

Repair Contract No. 79, Glens Falls-Saratoga County Highway No. 58, Section 1, Saratoga County: All bids held.

Repair Contract No. 81, Waterford County Highway No. 59, Section 2, Saratoga County: All bids held.

Repair Contract No. 82, Waterford County Highway No. 39, Section 1, Saratoga County: Kennedy & Easton Contracting Co., Albany, N. Y., $1,576 (awarded contract).

Repair Contract No. 72, Saugerties-Woodstock County Highways Nos. 37, 38, Sections 1 and 2, Ulster County: John E. Consaulis, Albany, N. Y., $46,916 (awarded contract on residuum).

Repair Contract No. 73, Kingston-Rifton County Highway No. 116, Ulster County: General Construction Co., Bridgeport, Conn., $13,400 (awarded contract on residuum).

Repair Contract No. 77, Loon Lake-Pottersville-Taylors County Highway No. 692, Warren County: Santanoni Construction Co., Albany, N. Y., $31,505 (awarded contract on Bermudez).

Repair Contract No. 74, Granville-Troy Stage County Highway No. 104, Washington County: R. Hopkins, Troy, N. Y., $7,435 (awarded contract on residuum).

Repair Contract No. 69, Echo-Lake Pines Bridge County Highway No. 143, Pines Bridge-Yorktown Heights County Highway No. 148, Westchester County: Yorktown Heights-Putnam County Line County Highway No. 149: All bids rejected.

Repair Contract No. 70, White Plains Cross Road County Highway No. 20, White Plains-Armonk County Highway No. 35, Westchester County; Armonk-Mt. Kisco County Highway No. 50: H. B. Sproul, Peekskill, N. Y., $55,890 (awarded contract on residuum).

Repair Contract No. 71, Mt. Kisco-Bedford County Highway No. 51, Bedford-Cross River County Highway No. 144, Westchester County; Cross River-Turk Mill County Highway No. 150: H. B. Sproul, Peekskill, N. Y., $66,690 (awarded contract on residuum).

S. Percy Hooker, chm. com., 53 Lancaster st., Albany, N. Y.

SEWERS.

CONTEMPLATED WORK.

Cresco, Ia.—New bids for sewer construction will be asked.

Oshkosh, Wis.—Plans for a sewer in Minnesota st. have been prepared.

Bushnell, Ill.—The installation of a sanitary sewer is contemplated.

Monroe City, Mo.—Plans for constructing sewers are being prepared.

Prosser, Wash.—Plans for constructing a sewerage system have been adopted.

Kenosha, Wis.—Council has adopted plans for a trunk sewer, 2 mis. in length.

Ellisville, Miss.—The construction of a sewerage system is contemplated. Mayor.

Madison, S. D.—Will vote on the issue of $100,000 for installing a sewer system.

Biwabik, Minn.—The village engineer will prepare plans for sewer construction.

Pensacola, Fla.—This city voted, June 14, to issue $100,000 bonds for additional sewerage.

Lake Charles, La.—Will vote July 14 on the issue of $160,000 for installing a sewerage system.

Sioux Falls, S. D.—The construction of a complete sewerage system is contemplated.

St. Cloud, Minn.—S. S. Chute, cy. engr., will prepare plans for a sewer on the east side.

Savannah, Ga.—J. N. Howard, cy. engr., estimates the cost of house drainage extensions at $382,919.

Topeka, Kan.—Engr. Fullin is preparing plans for the construction of a drainage system in North Topeka.

Hutchinson, Kan.—An ordinance has been adopted for constructing 6 additional sewers and sewer extensions.

Medicine Hat, Alta.—This city contemplates the construction of terra cotta sewers. H. K. Gimmer, cy. engr.

Chatham, N. J.—The construction of a sewage disposal plant here for the use of this city and Madison is contemplated.

East Aurora, N. Y.—Special.—A. Brotherhood, vil. prest., desires information regarding apparatus for pumping out cesspools.

New Bedford, Mass.—The city council has appropriated $50,000 for constructing the intercepting sewer. Wm. F. Williams, cy. engr.

Mt. Vernon, Ia.—Special.—This city contemplates the construction of a sewerage system and disposal plant. E. T. Gruwell, mayor.

Bakersfield, Cal.—The construction of vitrified pipe sewers in E, O, P, Q, R and S sts. is contemplated. A. L. Lightner, cy. clk.

Indianola, Ia.—Council will take action July 25 on the proposed sewer construction.

Winnemucca, Nev.—L. C. Kelsey, of Salt Lake City, has been engaged as consulting engineer of the proposed sewerage system.

Hutchinson, Kan.—An ordinance has been adopted for constructing a system of drainage in the eastern part of this city.

Los Angeles, Cal.—An ordinance has been passed to construct a concrete and brick storm sewer in Alameda and adjacent streets.

Peoria, Ill.—Plans for two sewer systems, one in the north and one in the south end of this city, are being prepared by Clay Belsley, cy. engr.

Silvis, Ill.—Surveys are being made for the construction of 3 mis. of vitrified tile storm sewer. Wallace Treichler, cons. engr., Rock Island.

Janesville, Wis.—A hearing will be held July 11 before Judge Germin in circuit court, regarding the organization of a drainage district in the town of Lima.

Windsor, Mo.—The city council will call a special election in the near future to vote on the issue of bonds for constructing a sewer and water-works system.

Leonia, N. J.—The South Side Sewer Co. has been incorporated by Benjamin H. Belknap, Edward Grinslade and Arthur D. Bovert, to operate plants for sewerage or drainage purposes.

Johnstown, N. Y.—The State health board has granted this city permission to construct a trunk line sewer along Cayadutta creek, from N. Market to Montgomery sts., provided the city file with the State board of health plans for a sewage disposal plant on or before June 1, 1911. Cy. engr. Campbell.

Pasadena, Cal.—S. T. Van Orm, cy. engr., has recommended the construction of sewers in California, Hill, Holliston, Chester, San Pasqual, Division and other streets. Plans have been adopted for a storm water sewer, consisting of a concrete open conduit, 1500 ft. in length, and the remainder to be reinforced concrete conduit. Herman Dyer, cy. clk.

Glen Cove, L. I., N. Y.—Special.—A report recommending the construction of 18 miles of 12 to 8-in. vit. pipe sewers and disposal by fine screening and discharge into twenty-one feet depth of water in Hempstead Bay at a total cost of $80,500 has just been presented to the Village Improvement Association of Glen Cove by W. B. Fuller, consulting engineer, 150 Nassau st., New York City. Mr. Fuller also recommends the parking of Glen Brook as a sanitary measure.

CONTRACTS TO BE LET.

Tracy, Minn.—Bids are asked until July 7 for constructing sewers. L. J. Fitch, cy. recdr.

Anderson, Ind.—Bids are asked until July 9 for constructing a ditch. Brice Dille, drainage comr.

Sabetha, Kan.—Bids are asked until July 12 for constructing sanitary sewers and 2 separate disposal works.

Plainfield, N. J.—Bids are asked until July 5 for constructing a storm sewer. A. J. Garett, cy. surv.

Le Mars, Ia.—Bids are asked until July 5 for constructing 863 ft. of 8-in. sewer. D. L. Struble, cy. clk.

Des Moines, Ia.—Bids are asked until July 6 for constructing sewers in a number of streets. J. R. Hanna, engr.

Omaha, Neb.—Bids are asked until July 5 for constructing sewers in certain districts. Dan B. Butler, cy. clk.

Appleton, Wis.—Bids are asked until July 6 for constructing sewers in various sts. W. L. Williams, cy. clk.

Eagle Grove, Ia.—Bids will be received about July 11 for constructing pipe sewers. Samuel Middleton, cy. clk.

Iowa Falls, Ia.—Bids are asked until July 6 for constructing a sewer system in dist. No. 11. J. O. Gregg, clk.

Grand Forks, N. D.—Bids are asked until July 5 for constructing a lateral sewer of clay pipe. Chas. J. Evanson, cy. audt.

East Chicago, Ind.—Bids are asked until July 20 for constructing 1800 ft. of sewer in 151st ave. R. K. Wallace, cy. engr.

Davenport, Ia.—Bids are asked until July 5 for constructing sewers in Telegraph st. and Summit ave. A. M. Compton, cy. engr.

Swift Current, Sask.—Bids are asked until July 12 for furnishing a large quantity of vitrified tile pipe. A. W. Snider, mayor.

Mason City, Ia.—Bids are asked until July 5 for constructing a lateral sewer in E. Howard st. J. H. McEwen, cy. clk.

South Bend, Ind.—Bids are asked until July 6 for constructing a pipe sewer in Milton ave. Otto C. Bastian, chm. B. P. W.

Davenport, Ia.—Bids are asked until July 6 for constructing a vitrified tile sewer in Christy st. A. M. Compton, cy. engr.

Carterville, Mo.—Bids are asked until July 7 for constructing a sanitary sewer in sewer dist. No. 2. F. A. Funk, cy. engr.

Plainfield, N. J.—Bids are asked until July 5 for constructing storm sewers. A. J. Cavett, cy. surv.; Jas. T. MacMurray, cy. clk.

St. Paul, Minn.—Bids are asked until July 5 for constructing a sewer in Capitol Heights and Gates st. R. L. Gorman, clk. B. P. W.

Sand Point, Idaho.—Bids are asked until July 11 for constructing a sewer system in 1st district. Dr. R. N. Jackson, chm. sewer com.

Oklahoma City, Okla.—Bids are asked until July 5 for constructing a lateral sewer in certain streets and blocks. Bob Parman, cy. clk.

Struthers, O.—Bids are asked until July 6 for constructing sanitary and storm water sewers in Short and Elm sts. L. S. Creed, vil. clk.

Balton, Tex.—Bids are asked until July 5 for constructing a system of sanitary sewers and a sewage purification plant. Chas. B. Smith.

Ft. Warren, Boston Harbor, Mass.—Bids are asked until July 7 for changes and extension of sewer system. Capt. A. M. Miller, constr. Q. M.

Cleveland, Miss.—Bids are asked until July 5 for the improvement of the channel of the Bayou Phalia. Wm. Connell, chm. bd. drainage comrs.

Savannah, Ga.—Bids are asked until July 25 for constructing a reinforced concrete drain in De Renne Canal. G. Reuben Butler, chr. co. comrs.

Harvard, Ill.—Bids are asked until July 5 for constructing ½ mi. of 12, 20, and 24-in. tile sewers. Hugh M. Price, cons. engr., 140 Dearborn st., Chicago.

Hugo, Okla.—Bids are asked until July 5 for constructing a sanitary sewer system, disposal plant, and all appurtenances. H. C. Blanchard, cy. engr.

Jacksonville, Fla.—Bids are asked until July 5 for constructing terra cotta and brick sewers. W. M. Bostwick, Jr., chm. w. w. trustees.

Winona, Minn.—Bids are asked until July 11 for constructing a storm water and sanitary sewer in 3rd and Liberty sts. Paul A. Jasmer, cy. recdr.

Attleboro, Mass.—Bids are asked until July 6 for constructing a trunk sewer and filtration areas, in 7 contracts. Chas. S. Holden, M. D., chm. comm. on sewerage.

Champaign, Ill.—Bids are asked until July 2 for constructing main open ditch in sub-districts No. 1, 2, 3, and 4. Alvah James, comr. special drainage dist., Mansfield, Ill.

Missoula, Mont.—Bids are asked until July 11 for constructing sanitary sewers in certain special improvement districts. C. W. Swearingen, cy. engr.; W. A. Logan, cy. clk.

Boston, Mass.—Bids are asked until July 9 for constructing a drain at the Navy Yard, Boston. R. C. Hollyday, ch. Bureau Yds. & Docks, Navy Dept., Washington, D. C.

Pella, Ia.—Bids are asked until July 6 for constructing 6 mis. of 8 to 15-in. pipe sewer and disposal plant. A. C. Kuyfer, cy. clk.; Iowa Engrg. Co., cons. engr., Clinton, Ia.

Leon, Ia.—Bids are asked until July 12 for constructing 2 mis. 6 to 12-in. pipe sewer and disposal plant. S. G. Mitchell, cy. clk.; Iowa Engrg. Co., cons. engrs., Clinton.

New York City.—Bids are asked until July 6 for constructing sewer in various sts. in Queens boro. Lawrence Gusser, prest. boro. Bids are asked until July 6 for constructing sewers in Brooklyn boro. Alfred E. Steers, prest. Brooklyn boro.

Charleston, S. C.—Bids are asked until July 11 for constructing a sewerage receiving tank, pump pit and appurtenances, including vertical centrifugal pumps and electric motors, with controlling devices. Bd. sewer comrs.

Morristown, Pa.—Bids are asked until July 8 for constructing a sewage disposal plant, laying c. i. and terra cotta pipe, constructing, collecting wells and pump houses, and furnishing machinery, for State Hospital for Insane. Frank L. Smith, treas.

Munising, Mich.—Bids are asked until July 7 for constructing 6834 ft. of 8 to 24-in. vitrified pipe; 1985 ft. 2 ft. by 3 ft., and 3 ft. by 3 ft. 6 in. concrete sewers; 2 bulkheads, 19 manholes, 19 catchbasins, 1 lamphole, 700 sewer catchbasin covers. Jas. Tracy, cy. clk.; W. G. Kirchoffer, cons. engr., Madison, Wis.

CONTRACTS AWARDED.

Evansville, Ind.—G. L. Hughes was awarded the contract, June 14, for building sewers.

Lincoln, Neb.—H. C. Gardner was awarded a contract for constructing the sewer and water works systems, for $13,489.

Frederick, Md.—Coblentz & Klipp secured the contract for constructing a sewer in Carroll and N. Market sts.

Sioux City, Ia.—Christenson & Co. was awarded the contract for constructing a storm sewer in Prospect st.

Depew, N. Y.—Anthony Hartung secured the contract for extending the sewer system on the south side, for about $35,000.

Havelock, Neb.—H. C. Gardner, of Lincoln, was awarded the contract, June 7, for the construction of a sewer system, for $13,849.

Baldwin, Kan.—The contract for constructing a sewer system was awarded

to the Squire Electric & Construction Co. of Kansas City, Mo.

North Andover, Mass.—Arthur A. O'Mahoney was awarded the contract for constructing 6300 lin. ft. of pipe sewers.

Marseilles, Ill.—Greens Sons Co. was awarded the contract for constructing a sewer for $26,744.

Ft. Sill, Okla.—The lowest bid submitted for constructing the sewage purification plant was that of Luyster & Lowe, of Dayton, O., which was $12,600.

San Francisco, Cal.—The Healy-Tibbitts Construction Co. secured the contract for constructing section A of the North Point Main sewer, for $164,300.

Syracuse, N. Y.—Albert Gafney was awarded a contract for constructing a sewerage system in Stinard and Gordon aves. and Giddes st., for $1,863.30.

Ann Arbor, Mich.—Contracts for constructing sewers have been awarded as follows: Koch Bros., dists. Nos. 41, 36, 37 and 40. E. L. Schneider, 2 sewers.

Westfield, Mo.—The contract for constructing 4100 ft. of pipe sewers was awarded, June 11, to Edward B. Roberts, 730 Old South Bldg., Boston, for $4,770.

Council Bluffs, Ia.—The contract for the excavation of Pigeon creek ditch was awarded to C. H. Stemberg & Sons, of Chicago, at 5.4 cts. a cu. yd. The work involves 788,000 cu. yds. of earth.

Tacoma, Wash.—Contracts for constructing sewers were awarded, June 7, as follows: Monroe st. storm sewer, L. Y. Stayton, $22,000; sanitary sewer in dist. No. 194, Tiguanelli & Paine, $4,900.

Macon, Ga.—The contract for constructing a new auxiliary system of sewers in Vineville, Horth Highlands, and newly annexed parts of the city was awarded, June 6, to R. S. Clemons & Co., for $5,632.18.

Portland, Ore.—The contract for constructing the Powell st. sewer system, in the Brooklyn dist., was awarded to Bechill Bros., for $19,576, and the E. 8th, E. 9th and E. 10th sts. systems to Wm. Lind, for $18,683.

Salt Lake City, Utah.—Special.—Contracts for sewer extensions were awarded, June 23, as follows: Sewer exten. No. 246, D. L. Pitt, $945.54; No. 267, J. D. Hanley, $698.25; No. 251, A. A. Clark, $34,475.22. G. F. McGonagle, cy. engr.

Newark, N. J.—Sewer contracts have been awarded as follows: Building sewers in Avenue A, Frelinghuysen ave. and Dayton st., Jas. A. Christie, $22,524.95; Park ave., Pasquali Maurillo, $1,548.40.

Boston, Mass.—Sewer contracts have been awarded as follows. Gainsborough st., McCarthy & Walsh, of East Boston, $5,181; Rosindale branch of Stony Brook conduit, Charles R. Gow & Co., 79 Milk st., $40,870; sec. 7 of Stony Brook conduit, Wm. J. Barry, 30 Fenwood road, Rexbury, $75,320.

Creston, Ia.—Special.—George W. Auracher was awarded a contract for constructing 1400 ft. of 6-in. sewer at 72½ cts. a lin. ft.; 1800 ft. 8-in. sewer at 95 cts.; 6-in. specials, 35 cts. each; 8-in. specials, 40 cts. each; manholes, 30-in. clear, 4-in. vitrified brick walls and 4-in. concrete bottom, no tops, $3.40 a ft.

Hubbell, Mich.—The contract for constructing sewers was awarded to the Pearce Hardware & Furniture Co., of Lake Minden, Mich., as follows: $1.87 per ft. for 300 ft. of 30-in. sewer tile; at 14 cts. per ft. for 100 ft. of 8-in. sewer tile; at $14 for one 30x30 Y; at $14 for one 30x30x20 Y, and at $7.48 for one 30x18 reducer.

New Hampton, Ia.—The contract for sewer construction was awarded to Fraser & Danforth, of Rochester, Minn., as follows: 55 cts, per ft. for the construction of 4,000 ft. of 8-in. sewer, and at 48½ cts. per ft. for the construction of 3,000 ft. of 4-in. water mains. The work includes manholes, flush tanks, hydrants and valves.

St. Louis, Mo.—Bids for constructing the first section of the Glaise Creek and River des Peres sewers were submitted, June 14, as follows: George G. Pendergast Construction Co., $161,392; Southern Construction Co., $165,785; Hoffman-Hogan Construction Co., $171,818; John F. McMahon, $179,696; Fruin-Colnon Construction Co., $182,427. The estimated cost of the sewer is $180,000. On the River des Peres work the bidders and amounts were: Southern Construction Co., $310,533; Scott-Harmon & Hickey, $375,270; American Engineering Co., $385,462. The estimate is $324,000.

WATER WORKS.

CONTEMPLATED WORK.

Worland, Wyo.—The construction of a water works system is contemplated.

Joseph, Ore.—A new municipal water works system will be built this summer.

Francis, Ore.—A water works system is contemplated.

Wyandotte, Mich.—The extension of the water works system is contemplated.

Wellington, Kan.—A water works system is contemplated.

Blytheville, Ark.—A water works system is contemplated.

Meridian, Idaho.—A water works system is proposed.

Lonsdale, Tenn.—A water works system is contemplated.

Liberty, Mo.—Voted to issue $20,000 for water works bonds.

Herrin, Ill.—The construction of a reservoir is contemplated.

Carson, Ia.—Will vote on the issue of $15,000 water works bonds.

Greenfield, Mass.—Voted to build a reservoir on Rucky Mountain.

Carson, Ia.—Will vote on the issue of bonds for a water works system.

Cleveland, Miss.—A water works system is contemplated. I. A. Kamden, town clk.

Grand Forks, N. D.—A filter and intake is contemplated. H. C. Lykken, cy. engr.

Conway, Ark.—Estimates have been completed for constructing a water works plant.

Canton, Kan.—Voted to issue bonds for installing water works and electric lights.

Amherst, O.—Bids will be asked for soon for constructing a water works system.

Clifton Heights, Pa.—Will vote on the issue of bonds for a water works system.

Kendrick, Idaho.—Will vote, July 10, on the issue of $10,000 bonds for water works.

Beecher, Ill.—An air pressure water works system will be installed. R. J. Ban, atty.

Atlanta, Ga.—The town of Kirkwood has asked this city to furnish it with water.

Lawton, Okla.—Bids will be asked for constructing a water works system in Gore addition.

Eureka Springs, Ark.—About $50,000 will be expended in improving the water works.

Petersburg, Va.—This city has appropriated $9,000 for an addition to the filter plant.

El Reno, Okla.—Bids will be asked soon for constructing a municipal water works plant.

Malden, Mo.—Bids will be asked for soon for constructing a water works and power plant.

East Alton, Ill.—The question of establishing a municipal water plant will be voted on.

Windsor, Mo.—This city will issue bonds for the construction of a water works system.

Pittsburg, Kan.—This city will vote on the issue of bonds for constructing a water works plant.

Glasgow, N. S.—Preliminary surveys are being made for a water works system. Jas. Ray, town clk.

Kaw City, Okla.—This city will vote on the issue of bonds for constructing a municipal water works system.

Douglas, Ga.—The improvement of the water works system is contemplated. R. W. Peatross, cy. engr.

Kingsley, Ia.—This city voted to install water works, and bids will be asked for their construction.

Norfolk, Va.—This city will appropriate $17,000 for extensions of the water mains in the 7th ward.

Connersville, Ind.—Plans for an improved water works system will be prepared by engineer Marvin.

Toulen, Ill.—An ordinance has been passed providing for the establishment of a municipal water works system.

Aransas Pass, Tex.—This city will vote on the issue of bonds for installing a municipal water works system.

Limon, Colo.—Plans are being prepared for constructing a water works and electris light plant.

Shiner, Tex.—The question of issuing bonds for the extension of the water works system will be voted on.

Binghamton, N. Y.—Bids may be asked in September for constructing a reservoir on Mt. Prospect at Mygatt st.

Abbeville, Ala.—This city will vote, July 19, on the issue of bonds for installing a water works system.

Beatrice, Neb.—The city voted to issue $70,000 bonds for water works extension and a municipal light plant.

Collins, Miss.—Bids will be received soon for constructing a concrete underground or a steel overground reservoir.

Columbia, S. C.—The construction of a 9-inch water main in Huyer st. to supply water to Glencoe Mills is contemplated.

Naples, Tex.—Hon. B. R. Watts has applied for a franchise to erect an electric light plant and water works system.

St. Augustine, Fla.—A committee has been appointed to consider the installation of modern machinery in the water works plant.

Pittsburg, Pa.—Mayor Magee has signed an ordinance providing for the extension of the city filtration plant at Aspinwall.

St. Petersburg, Fla.—Will vote July 19 on the issue of bonds for the improvement and extension of the water works system.

Atlanta, Ga.—College Park voted to issue $65,000 bonds for constructing water works, sewerage and electric light systems.

Woodland, Cal.—The board of trustees have decided to investigate the question of securing a pumping and auxiliary pumping plant.

Tabor, Ia.—The citizens have asked that a special election be called to vote on a bond issue for an improved or new water supply.

Kearney, Neb.—This city voted to purchase the water works plant at the figures offered by the American Water Company, $125,000.

New Bethlehem, Pa.—(Special)—S. C. Hilliard, supt. Citizens' Water Co., says they expect to install an additional gas engine pumping unit soon.

St. Augustine, Fla.—Mayor Masters is a member of a committee appointed to consider the question of installing modern machinery in the water works.

Safford, Ariz.—This city contemplates piping water from Graham mountain, a distance of 8 miles. Reservoirs and dams will also be constructed.

Bristol, Pa.—The borough council has approved the engineer's plans and detailed drawings for a complete municipal water works system and filtration plant.

Baltimore, Md.—New specifications have been approved and bids will be asked for soon for constructing a pumping station for the high-pressure pipe line.

Bucyrus, O.—The committee on extension of water mains has reported favorably on the extension of water mains on Gallon, Plymouth and E. Mansfield sts. and Faustina ave.

Plainfield, N. J.—The advisability of purchasing, constructing or condemning the water works plant will be investigated by Jas. H. Fuertes, 140 Nassau st., New York City.

Weston, Ore.—Extensive repairs are contemplated for the water works system, and the water committee has been empowered to purchase piping, gates and hydrants.

Rossville, Ill.—Owing to the inadequacy of the water works system, the water board has begun the formulation of plans for the removal of the old plant and the constructiin of a new one.

Indianapolis, Ind.—The Indianapolis Water Co. has made a proposition to the Board of Public Works, offering to rent the Brightwood water works plant, which has been taken under consideration.

Harrisburg, Pa.—Application has been made by this city to the State Water Comm. for permission to construct a dam across the river at the lower end of this city. M. B. Cowden, cy. engr.

Charleston, S. C.—The city council decided, June 14, that the Charleston Light and Water Co. had failed to comply with the requirements of the contract and refused to grant the franchise.

Eveleth, Minn.—The city engineer has been directed to prepare plans and specifications for installing 4,000 ft. of 16-in. c. i. water pipe from the Foyal location to the water works system.

Winnifield, La.—The water works comm. have appointed a committee of two to confer with Mayor Cooper regarding the making of a map and in determining in what streets additional water mains shall be laid.

Batavia, N. Y.—(Special)—Plans and specifications have been prepared and bids will be received about July 20 for constructing a concrete dam of about 500 cu. yds. Fred New, vil. clk.; Russell A. Wentworth, cy. engr.

South Bend, Ind.—The water works system will be entirely rebuilt this year at an estimated cost of $50,000. An electris power pumping station will be erected in Leefer Park and will take the place of both the north and central stations of the present system, and the old plants will be dismantled and abandoned.

Salem, Ore.—A report has been submitted by J. T. Whistler, cons. engr., of Portland, on furnishing this city with a new water supply. He recommends the Little North Fork of the Santiam river, providing for a filtered system of 10,000,000 gals. per day, at a cost of $1,430,000;

or, an unfiltered system from the Breintenbush river, of 15,000,000 gals. per day, at a cost of $1,780,000; or, a filtered system from the Willamette river, of 16,000,000 gals. per day, at a cost of $1,240,000.

CONTRACTS TO BE LET.

Louisa Va.—Bids are asked until July 2 for boring an artesian well. J. J. Porter.

Chisholm, Minn.—Bids are asked until July 6 for constructing a 300,000-gal. storage tank.

Cando, N. D.—Bids are asked until July 11 for digging a well. H. D. Skinner, cy. audt.

Albion, Pa.—Bids are asked until July 5 for constructing a water works system. S. A. Collins, town clk.

Ft. Smith, Ark.—Bids are asked until July 6 for extension of the water mains. Bd. public affairs.

New York City.—Bids are asked until July 6 for 5 portable meters. Henry S. Thompson, comr. water sup., etc.

Waynesboro, Va.—Bids are asked until July 8 for constructing a steel standpipe. P. D. Woodine, town prest.

Mountain Lake, Minn.—Bids are asked until July 2 for the extension of the water works system. J. H. Dickman, clk.

Mason City, Ia.—Bids are asked until July 5 for drilling 1, with the privilege of 2 or 3, 10-in. wells. Cy. clk.

Salt Lake City, Utah.—Bids are asked until July 8 for sinking an artesian well on Levan Ridge. W. H. Farnsworth, sec. land bd.

Boulder, Colo.—Bids are asked until July 18 for constructing a rubble concrete masonry dam at Albion Lake reservoir. Cy. Coun.

Corydon, Ia.—Bids are asked until July 11 for drilling a deep well. J. J. C. Bower, cy. clk.; Iowa Engrg. Co., cons. engrs., Clinton.

Union City, Mich.—Bids are asked until July 11 for constructing seven 6-in. tubular wells at the water works station. Adelbert Thum, vil. clk.

Grand Rapids, Mich.—Bids are asked until July 7 for constructing a clear water conduit, intake and drain. Henry J. Klevorn, pres. B. P. W.

Spooner, Wis.—Bids are asked until July 5 for laying 5,500 ft. of 4-in. water main and furnishing 4 hydrants. Geo. B. Sage, cy. clk.

Muskogee, Okla.—Bids are asked until July 5 for furnishing 16,130 ft. 6-in. c. i. pipe, fire hydrants, etc. Chas. Wheeler, Jr., cy. clk.

New York City.—Bids are asked until July 6 for constructing water mains in Mosholu Parkway, Jerome ave., etc. Henry S. Thompson, comr. water sup.

Viroqua, Wis.—Bids are asked until July 7 for constructing a pump house. Cy. clk.

Faulkton, S. D.—(Special)—A. Boller, w. w. comr., says this city is in the market for one triplex pump of 450 gals. per minute, and 8 and 4-in. c. i. pipe.

Denver, Colo.—Bids are asked until July 2 for constructing a storage reservoir at Santa Maria Lake. Frank C. Goudy, pres. Rio Grande Reservoir and Ditch Co.

Ft. Mason (San Francisco P. O.), Cal.—Bids are asked until July 5 for constructing an 8-in. water main from Presidio of San Francisco to Ft. Mason. Major Geo. McK. Williamson, Q. M.

CONTRACTS AWARDED.

Center, Tex.—The contract for the extension of the water works system was awarded to H. C. Barrow.

Duluth, Minn.—Johnson & Johnson secured the contract for 25 sections for 12,298 ft. of water and gas main extensions.

Waterbury, Conn.—The contract for constructing the Morris reservoir was awarded to Ryan & Unmack, of New Haven, for $528,463.

Dows, Ia.—The contract for the extension of the water works system was awarded to the Des Moines Bridge and Iron Co., of Des Moines.

Attleboro, Mass.—The contract for constructing a new reservoir was awarded, June 10, to Bruno & Petitte, 18 Tremont st., Boston, for $48,460.

Nashville, Tenn.—The contract for the purchase of 215 ⅝-in. water meters was awarded to the National Meter Co. at $10 each for the meters.

Galveston, Tex.—The contract for furnishing c. i. water pipe and fittings was awarded, June 9, to the American C. I. Pipe Co., of Birmingham, for $2,000.

Englewood, Kas.—The contract for engineering work in connection with the proposed water works system was awarded to the J. S. Worley Co., of Kansas City, Mo.

Batesville, Ind.—The contract for the extension of the water mains was awarded, June 6, to the Bourbon Copper and Brass Works, of Cincinnati, for $3,130.

Essexville, Mich.—Peter Peterson, of Bay City, has been awarded the contract for the excavation and laying of water pipes for the new water works system.

Fairfax, Okla.—The contract for constructing a water works and sewerage systems was awarded to the Southwestern Engineering Co., of Oklahoma City, for $50,000.

Raymond, Mich. — The contract for erecting a tower and tank and constructing 2,000 ft. of mains was awarded to the Des Moines Bridge and Iron Co., of Des Moines, Ia., for $5,488.

Tyrone, Pa.—The Vipond Construction Co., of Altoona, Pa., was awarded, June 10, the contract for constructing a storage reservoir and for an addition to the present reservoir.

Jacksonville, Ill.—The contract for constructing the water ppe to connect the city mains with the Widenham-Daub wells was awarded to the Jacksonville Plumbing and Heating Co.

Hammond, Ind.—The Calumet Construction Co., 234 LaSalle st., Chicago, was awarded the contract, June 15, for the extension of the water supply intake in Lake Michigan, for $47,140.

New Baden, Ill.—Contracts have been awarded as follows: Tank and tower, Fred J. Koch; laying 2,700 ft. 8-in., 1,900 ft. 6-in. and 150 ft. 4-in. pipe, at 84, 62 and 45 cts. a ft., respectively, J. A. Hartman, of Olney, Ill.

Seattle, Wash.—Contracts for constructing water mains have been awarded as follows: West 59th st. and other streets, water mains, to Allain & Hull, at $9,878; Klickitat ave. and other streets, water mains, to Will Kopta, at $15,182; West 63d st., sewer, to G. Savistio, at $4,234; California ave. and other streets, sewer, to Allain & Hull, at $18,915; North 51st st., water mains, to Jahn Construction Co., at $39,865.

Duluth, Minn.—Contracts for water and gas main extensions have been awarded as follows: Johnson & Johnson, 6,892 feet for $5,208; Pastoret & Lawrence Co., 2,316 feet for $1,802; Kern & Nickerson, 2,472 feet for $2,621; Fairbanks, Morse & Co., 408 feet for $288; Erick Nordquist & Co., 372 feet for $1,741, and McAdams, Preston & Co., 468 feet for $373.

BRIDGES.

Bluffton, Ind.—Bids are asked until July 8 for constructing 7 bridges. O. D. Garrett, co. audt.

Pierre, S. D.—Bids are asked until July 5 for building various bridges. C. M. Price, co. audt.

Lebanon, Ind.—Bids are asked until July 8 for constructing 7 bridges. B. F. Herdrich, co. audt.

Hartford City, Ind.—Bids are asked until July 5 for building 5 culverts. L. W. Daugherty, co. audt.

Quebec, Que.—Bids will be received until Sept. 1 for constructing the Quebec bridge.

Solon, Me.—A new bridge across the Kennebec river at Aubden and Solon, is contemplated.

Mt. Gilead, O.—Bids are asked until July 7 for constructing a steel bridge. Clifton Sipe, co. audt.

Cleveland, O.—Bids are asked until July 13 for constructing bridge work. F. R. Lander, co. surveyor.

Frankling, Pa.—Bids are asked until July 7 for building Petroleum bridge at Oil City. A. C. Lewes, co. audt.

Arcadia, Tex.—Bids are asked until July 5 for building 50 to 100 wooden bridges. R. W. Luttrell, engr. drain dist.

Lawrenceburg, Ind.—Bids are asked until July 5 for constructing a bridge over Hogan creek. W. L. Fagaly, co. audt.

Crown Point, Ind.—Bids are asked until July 5 for constructing a bridge in Ross twp. C. A. Johnson, co. audt.

Shelbyville, Ind.—Bids are asked until July 6 for the repair of Custinger bridge. G. B. Huntington, co. audt.

Ft. Benton, Mont.—Bids are asked until July 11 for constructing a combination or steel bridge. W. R. Leet, co. clk.

Fargo, N. D.—Bids are asked until July 6 for constructing and repairing bridges. Arthur G. Lewis, co. audt.

Ottawa, Can.—Bids are asked until July 4 for constructing a bridge across the Saskatchewan river at Pas Mission.

Omaha, Neb.—Bids are asked until July 30 for constructing bridges during the next year. D. M. Haverly, co. clk.

Greenfield, Ind.—Bids are asked until July 5 for constructing 3 concrete and steel bridges. C. H. Troy, co. audt.

Martinsville, Ind.—Bids are asked until July 5 for constructing a bridge in Gregg twp. B. E. Thornburgh, co. audt.

Syracuse, N. Y.—The National Construction Co. has been awarded a contract for a steel plate girder bridge for $37,057.

Binghamton, N. Y.—Bids are asked until July 11 for the reconstruction of a river bridge over Chenango river. Co. comrs.

Jeffersonville, Ind.—Bids are asked until July 16 for constructing a bridge over Logan creek. Peter Machaud, co. audt.

Danville, Ill.—Bids are asked until July 5 for constructing a reinforced concrete bridge of 3 arches. F. Payne, town engr.

Albion, Ind.—Bids are asked until July 5 for constructing and repairing bridges, culverts and abutments. John W. Earle, co. audt.

Bloomington, Ill.—Plans are being formulated for constructing new crossings over the Chicago & Alton tracks. R. L. Carlock, engr.

Peru, Ind.—Bids are asked until July 6 for the repair of Eel river bridge, in the town of Mexico. Chas. Griswold, co. audt.

Visalia, Cal.—Bids are asked until July 12 for constructing a reinforced concrete conduit and bridges. Marve L. Weaver, cy. engr.

Pocatello, Idaho.—Bids are asked until July 17 for constructing a steel bridge across Bear river at Soda Springs. Bd. co. comrs.

Frankfort, Ind.—Bids are asked until July 6 for the repair of 20 bridges and constructing one new bridge. C. F. Cromwell, co. audt.

Alexandria, La.—Bids are asked until July 28 for building creosoted timber frame protection, fender on piles. Ira W. Sylvester, co. engr.

Greenville, Miss.—Bids are asked until July 4 for constructing a steel bridge across Bayou Phalia, at Ingram. W. W. Miller, clk. bd. supvrs.

Cincinnati, O.—Bids are asked until July 8 for constructing a concrete bridge in Harris ave., Mt. Washington and Anderson twps. Fred Dreihs, ch. co. comrs.

West Point, Miss.—Bids are asked until July 5 for constructing a trestle about 200 ft. long on the west side of Houlka drainage canal. L. J. Howard, co. clk.

Columbus, Ga.—Bids are asked until July 18 for constructing a concrete steel arch bridge over the Chattahoochee river at Dillingham st. W. A. Campbell, supt. pub. wks.

Wilmington, Del.—The contract for building a concrete bridge at Moxentown mill dam, in St. George's Hundred, was awarded to H. M. Lockwood, of Middletown, for $3,160.

Philadelphia, Pa.—The contract for a highway bridge on the line of Fox st., over P. G. & N. R. R., has been awarded to Richard Walsh, 5922 Tacony st., for $35,479.

Jamestown, N. Y.—The contract for constructing concrete bridges over the Chadakoni river, at Fairmount ave. and Winsor st., was awarded to Mahoney & Sevanson, for $50,000.

Columbus, O.—Bids are asked until July 14 for constructing the substructure roadway approaches of the Grant river bridge on Jackson Pike, in Jackson twp. Co. comrs.

Sandusky, O.—Bids are asked until July 9 for constructing a highway bascule bridge over Huron river at Van Rensselear st. crossing in Huron, O. John Deist, co. audt.

Los Angeles, Cal.—Bids are asked until July 5 for constructing a concrete culvert across Walnut st. on Valley Center ave. in Glendora and San Jose roads districts. C. G. Keyes, co. clk.

Leesburg, Va.—Bids are asked until July 25 for constructing reinforced concrete or iron bridge across "The Dutchman," and for a bridge over Little river. J. J. Crim, ch. co. comrs.

San Luis Obispo, Cal.—Bids are asked until July 6 for constructing a steel concrete highway bridge over Saline river at Rictor crossing on the Santa Margarita and oPse road. H. H. Carpenter, clk. bd. supvrs.

Richmond, Ind.—Bids are asked until July 5 for constructing a concrete arch bridge and fills in Clay twp.; steel bridge in Franklin twp.; concrete pier bridge in Boston twp.; 2 concrete culverts and repair of 2 bridges. D. S. Cole, co. audt.

STREET LIGHTING.

Canton, Kas.—Voted to issue bonds for an electric light plant.

McKenzie, Tenn.—Voted to issue bonds for a street lighting system.

Francis, Okla.—Voted to issue bonds for installing an electric light plant.

Beatrice, Neb.—Voted to issue bonds for a municipal electric light plant.

Atlanta, Ga.—Voted to issue bonds for installing an electric light system.

Naples, Tex.—Hon. B. R. Watts has made application for an electric light franchise.

West Point, N. Y.—Bids are asked until July 6 for installing extension of steam distributing system. Q. M.

Centerville, Md.—The town bd. of comrs. is considering an application for a franchise to install a gas plant.

South Bend, Ind.—This city is considering plans for installing ornamental street lamps on some of the principal business streets.

Logansport, Ind.—The business men have decided to install an ornamental system of street lamps in Market, Third and Fourth sts.

Lafayette, Ga.—Plans and specifications for a municipal electric light plant will be made by J. D. McCrary & Co., of Atlanta.

Quincy, Ill.—An ordinance was introduced, June 20, providing for a franchise for a gas and electric light plant. The ordinance will come up for final reading, July 19.

Memphis, Tenn.—Bids are asked until July 5 for furnishing incandescent gas and gasoline lights, and equipment and maintenance of same. Ennis M. Douglas, cy. clk.

Sturgis, Mich.—Bids are asked until July 6 for constructing a brick and concrete water power station, excavating for a tail race, and constructing a concrete multiple arch spillway and an earth embankment. B. P. W.

PARKS.

Dover, N. H.—An acre of ground has been presented to this city by J. Belknap Guppey, for a small park.

Peoria, Ill.—The park bd. has purchased the Bemis house site for park purposes.

Akron, O.—The park board has asked for an appropriation of $20,000 for the purchase and improvement of 6 acres of land.

Oklahoma City, Okla.—A $400,000 bond issue has been decided upon for park purposes and for circling the city with a gravel boulevard.

Washington, D. C.—A bill was introduced, June 6, providing for the purchase of 4 squares of land in Pelworth addition for a public park.

Memphis, Tenn.—The park commissioners have provided a park for colored people, to be maintained on the same lines as the other public parks.

GARBAGE DISPOSAL, STREET CLEANING AND SPRINKLING.

Natchez, Miss.—Bids are asked until August 3 for sprinkling streets. W. G. Benbrook, engr.

Hutchinson, Kas.—Bids are asked until July 8 for sprinkling Sixth ave. for 1 yr. Ed. Metz, cy. clk.

St. Joseph, Mo.—The installation of a garbage incinerator plant is contemplated by the bd. of health.

Toledo, O.—Fred C. Alber, of Cleveland, was awarded the contract, June 10, for the disposal of the city's garbage.

Vancouver, B. C.—The contract for the new refuse and garbage destructor was awarded to the Public Works Engineering Co., Beck Bldg., Portland, Ore., for $72,500.

Portland, Ore.—(Special)—The Public Works Engineering Co., Beck Bldg., advises us that it is in the market for about 75,000,000 fire brick; roof tiling; 2 sets wagon scales; 2 recorders; temperature testing apparatus; 1 150-ft. chimney; 2 150-h.p. water tube boilers; 4 blower fans; 4 engines; steel dumping cars for incinerator, at Vancouver, B. C. Fred O. Potter.

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